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USDA Forest Service Resource Bulletin PNW-46

CHANGES IN COMMERCIAL FOREST AREA IN OREGON AND WASHINGTON 1945 - 70

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ABSTRACT

Between 1945 and 1970, nearly 1 million acres of commercial forest land in Oregon and Washington were converted to nonforest uses. Road construction was the leading cause; urban and industrial expansion the second most important cause. Other significant causes of forest loss were agricultural clearing, powerline clearing, and construction of reservoirs and other bodies of water. An additional 362,000 acres of commercial forest have been set aside in reserved areas. Several changes in the ownership pattern of forest land have occurred, including an increase in National Forest and forest industry land and a decrease in Indian and farmer-owned land.

KEYWORDS: Forest ownership, forest conversion.

INTRODUCTION

Forest is the natural vegetative cover over most of western Oregon and Washington and large areas in eastern Oregon and Washington. In many parts of the Pacific Northwest, timber has been and still is the economic mainstay--the basic resource supporting communities. Forests not only provide the raw material for the wood products industries, but they directly or indirectly affect man and the environment in many ways. Commercial and sports fisheries and the shellfish industry can be affected by the condition of watersheds, which in many areas are forest lands. Many species of animals are sensitive to changes in the forest and some could not survive without the forest as a source of food and cover. As population increases, forests are of increasing importance simply for their natural beauty and as quiet retreats where people can escape from the noise and tension of the city.

Since the first settlers came to the Oregon Territory a little over 125 years ago, the composition and appearance of the forest have changed greatly; and its total area has decreased.

This report summarizes information on losses of commercial forest[1] in Oregon and Washington (see tables 1-3). The greater portion of the loss has been caused by physical conversion to roads, urban development, agriculture, powerlines, and reservoirs. These forest losses reduce the wood supply and alter the environment in various ways. Of lesser importance has been the loss of commercial forest land to dedicated Wilderness, Parks, and other reservations. Though these losses also reduce the wood supply, in most cases such reserved forests are in the high mountains and are relatively low in productivity. Reservations do not physically change the forest.

The information in this report was gathered and compiled by the Forest Survey Project of the Pacific Northwest Forest and Range Experiment Station. This information should be useful to legislators, land use planners and managers, and others who need to be aware of what is happening to our forests.

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[1] *Commercial forest land is forest land that is producing, or capable of producing, crops of industrial wood and is not withdrawn or developed for other uses. Commercial forest is capable of growing at least 20 cubic feet of wood per acre per year.*

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Table 1.--*Conversion of commercial forest land to nonforest land by ownership and cause, Oregon and Washington, 1945-70*

(In thousand acres)

State and ownership	Roads	Reservoirs	Powerlines	Farm-pasture-Christmas trees	Urban-industrial	Miscellaneous	Total
Oregon:							
National Forest	100	25	15	0	0	(1/)	140
Other public	79	6	8	7	0	7	107
Forest industry	13	1	4	0	0	2/ -8	10
Farm and miscellaneous private	23	3	32	22	28	0	108
Total	215	35	59	29	28	2/ -1	365
Washington:							
National Forest	33	10	3	0	0	0	46
Other public	22	1	33	2/ -18	35	0	73
Forest industry	50	0	38	13	8	0	109
Farm and miscellaneous private	27	9	16	135	214	1	402
Total	132	20	90	130	257	1	630
Oregon-Washington:							
National Forest	133	35	18	0	0	(1/)	186
Other public	101	7	41	2/ -11	35	7	180
Forest industry	63	1	42	13	8	2/ -8	119
Farm and miscellaneous private	50	12	48	157	242	1	510
Total	347	55	149	159	285	0	995
Percent of total	35	5	15	16	29	0	100

1/ Less than 500 acres.

2/ Minus indicates a gain of forest land.

Table 2.--*Area of forest land by land class, Oregon and Washington, January 1, 1970*

(In thousand acres)

Land class	Oregon	Washington	Total
Commercial forest	25,673	18,401	44,074
Commercial reserved forest	647	1,446	2,093
Noncommercial forest[1/]	4,026	3,108	7,134
Deferred forest[2/]	58	143	201
Total	30,404	23,098	53,502

[1/] Noncommercial forest is forest land that is not capable of growing 20 cubic feet of industrial wood per year, or is too steep and rocky for harvesting and growing timber crops.

[2/] Deferred forest is commercial forest land within National Forests that is currently being considered for Wilderness status.

Table 3.--*Area of commercial forest land, by ownership, Oregon and Washington, January 1, 1970*

(In thousand acres)

Ownership	Oregon	Washington	Total
National Forest	12,003	5,424	17,427
Other public:			
Bureau of Land Management	2,246	48	2,294
Bureau of Indian Affairs	324	1,593	1,917
Miscellaneous Federal	8	168	176
State	800	2,116	2,916
County and municipal	138	169	307
Total	3,516	4,094	7,610
Forest industry	5,206	4,348	9,554
Farmer	2,850	1,866	4,716
Miscellaneous private	2,098	2,669	4,767
All ownerships	25,673	18,401	44,074

PHYSICAL CHANGES IN COMMERCIAL FOREST AREA

Nearly 1 million acres have been lost since 1945

Since 1945, the loss of commercial forest in Oregon and Washington due to clearing for other uses is estimated to be 995,000 acres (this does not include clearcutting on land remaining in timber-growing use). This is 2.2 percent of the total commercial forest area in 1945. Over 850,000 acres, or 85 percent of the loss, has been in the Douglas-fir region, that is, west of the summit of the Cascade Range in the more productive forests of Oregon and Washington.

Road construction was leading cause of forest loss in the two States

Roadbuilding and widening have accounted for about 347,000 acres, or 35 percent of the total commercial forest loss, in Oregon and Washington (figs. 1 and 2). Roadbuilding since 1945 has been heaviest in the forests of western Oregon, concentrated largely on National Forest and Bureau of Land Management lands. By general ownership class, roads have accounted for:

1. About 72 percent of total losses on National Forest lands.
2. About 56 percent of total losses on other public[2] lands.
3. About 18 percent of total losses on private lands.

Urban and industrial expansion was second most important cause of loss in the two States

Urban and industrial expansion has been the second most important cause of commercial forest losses, accounting for about 285,000 acres, or 29 percent of total losses. Over 85 percent of this was in western Washington (fig. 3). Urban and industrial expansion led road construction as a cause of forest loss for all ownerships over the entire State of Washington.

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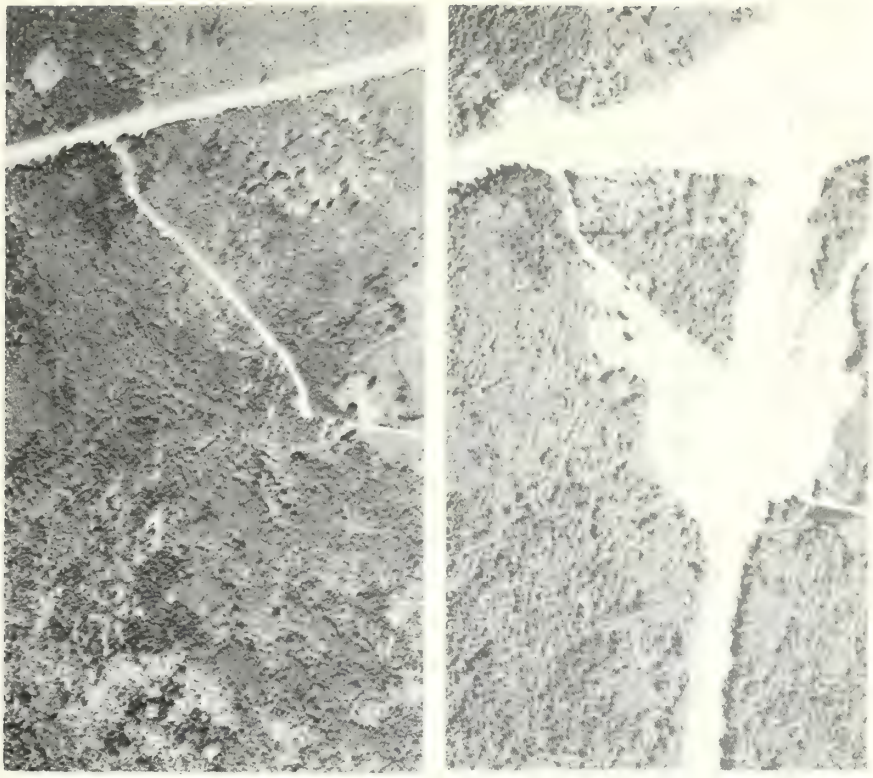
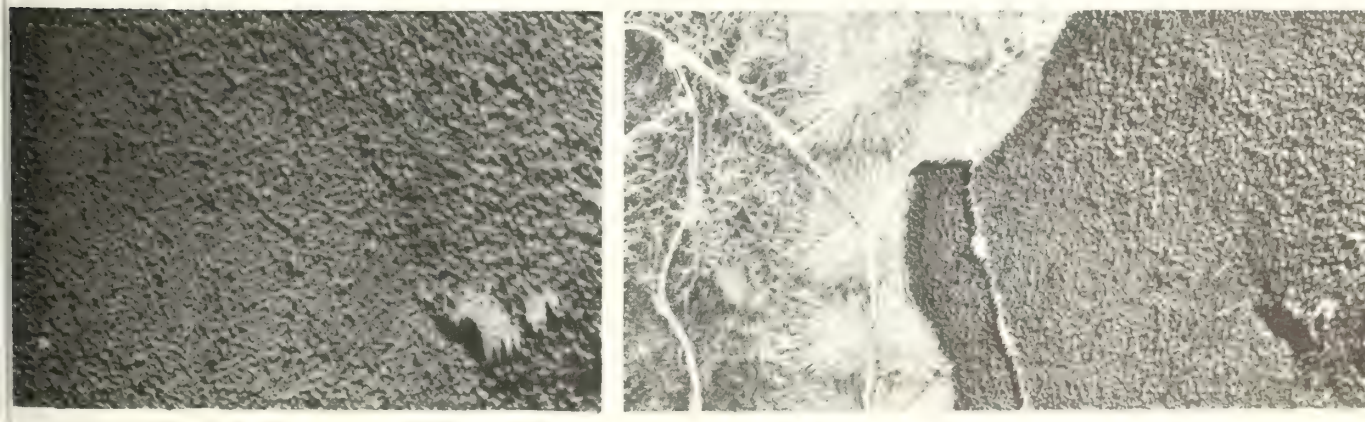
[2] *Other public owners primarily include Bureau of Land Management, Bureau of Indian Affairs, Department of Defense, the two States, counties, and municipalities.*



1956 1964

Figure 1.--This highway intersection near Maple Valley, Washington, has replaced about 25 acres of forest. The new road right-of-way is 140 feet wide and occupies 17 acres for every mile of length.



1956 1962

Figure 2.--Over 40,000 miles of permanent logging roads were built in Oregon and Washington between 1945 and 1970. Temporary logging roads and "skid trails," appearing as a network pattern in the 1962 photograph, are not considered as forest loss.

1955 1965

Figure 3.--Urban expansion is rapidly changing the character of the Puget Sound area in western *Washington*.

As one might expect, urban and industrial expansion was generally confined to private lands, though some commercial forest losses did occur on military reservations, State-owned lands, and other public holdings. Most of the urban and industrial expansion occurred on the farm and miscellaneous private land, though some forest industry-owned land was also developed. Several timber companies have real estate subdivisions and have been converting forest land to home sites. Farmer-owned land is usually sold to a land developer or real estate company before it is developed. Development has historically spread along main transportation routes, but an increasing number of outlying developments are appearing in many areas in both Oregon and Washington (fig. 4).

Farm and pasture clearings caused 16 percent of loss

The net loss due to clearings for agricultural use, including livestock grazing and Christmas tree growing, was 159,000 acres, or 16 percent of total loss. These losses were almost totally confined to western Oregon and western

Figure 4.--Urban and commercial developments are no longer confined to main transportation routes and the outskirts of cities.

Washington (fig. 5) and to private lands (except some Christmas tree lands owned by the State of Washington). Included in this category are a few large agricultural clearings by ranchers and farmers, as well as numerous small clearings by nonfarm owners such as those who own 5 to 40 acres of land and need small pastures for one or more riding horses. Losses in eastern Oregon and eastern Washington were nearly offset by gains due to forest reclaiming abandoned fields and pastures.

Powerline clearings caused 15 percent of loss

About 149,000 acres of commercial forest have been converted to powerline rights-of-way that are at least 120 feet wide (fig. 6). Loss of forest to powerlines was distributed fairly evenly among ownerships, though proportionally somewhat higher on private lands than on public lands. Though many long-distance transmission lines are routed over public lands away from cities, they are more numerous near urban and industrial centers where the forest is largely in private ownership.

Reservoirs and other impoundments caused 5 percent of loss

The loss of commercial forest due to the construction of reservoirs and other artificial bodies of water was about 55,000 acres. Included are a number of large reservoirs built by power companies and Government agencies (fig. 7), as well as numerous small lakes constructed by individuals and small corporations. In western Washington, some small lakes on private lands have been created as part of real estate developments (fig. 8). Reservoirs are also used for recreation, livestock watering, and irrigation.

Net effect of all other causes of commercial forest loss is negligible

All other causes of commercial forest change were lumped together and the results showed a net loss of only a few hundred acres. Included were forest clearings at mine sites, ski runs, dumps, as well as natural changes. Some natural changes noted were loss of forest from landslides (fig. 9), both loss and gain of forest along streams and near the Pacific coast, and encroachment of forest into natural openings in eastern Oregon and eastern Washington.[3]

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[3] *By Forest Survey standards, an area must be at least 10 percent stocked with trees to be classified as forest.*

1956

1964

Skagit County, Washington

Clackamas County, Oregon

Figure 5.--Forest clearings for agricultural purposes have been confined mostly to river valleys in western Oregon and western Washington.

Figure 6.--This powerline right-of-way in northwestern Oregon is 600 feet wide. For each mile in length, it occupies 73 acres of land. A 20-mile-long section of this right-of-way through average forest land removes about 1.4 million board feet of potential annual timber production.

Figure 7.--Dams and reservoirs built for power generation have replaced thousands of acres of forest.

1955 1965

Figure 8.--These two lakes in Pierce County, Washington, have replaced about 20 acres of forest. They are part of a real estate development that was not completed when the photograph was taken.

Figure 9.--This mountainside near Darrington, Washington, was forested before a landslide destroyed the trees. The landslide was triggered by construction of a logging road part way up the slope.

CHANGES IN RESERVED COMMERCIAL FOREST AREA

Since 1945, the total area of commercial forest land set aside in Parks, Wildernesses, Natural Areas, Botanical Areas, and other reservations has increased by 362,000 acres. These are predominantly public lands, administered by the U.S. Forest Service or the National Park Service, but they also include areas managed by the Bureau of Land Management, the two States, counties, and others.

The following tabulation shows reserved commercial forest area at four points in time in Oregon and Washington.

Year	Oregon	Washington	Total
	- - - - - (Thousand acres) - - - - -		
1945	669	1,062	1,731
1953	1,021	1,301	2,322
1963	691	1,347	2,038
1970	647	1,446	2,093

The fluctuation in reserved commercial forest acreage in Oregon between 1945 and 1963 is largely due to changing definitions used by the Forest Service to classify National Forest lands. In the period 1945 to 1953, the Forest Service designated large tracts of land as "limited areas," to be reserved from timber cutting pending further study. Included were Illinois Canyon on the Siskiyou National Forest, Eagle Creek on the Mount Hood National Forest, Umpqua and Diamond Lakes on the Umpqua National Forest, and Waldo Lake on the Deschutes and Willamette National Forests. In the 1953-63 period, some of these limited areas were reclassified as commercial forest. Portions of these former limited areas as well as some other areas in both Oregon and Washington are under study for wilderness and other restricted uses and are currently classified as "deferred" (fig. 10). In the 1953-63 period, some reductions were also made in the existing wild and primitive areas before they were officially designated as Wilderness.

The decrease in reserved commercial forest area in Oregon between 1963 and 1970 is due to the reclassification of the Sky Lakes limited area on the Rogue River and Winema National Forests from reserved to deferred.

Figure 10.--The forests in Wildernesses and other reservations are mostly in the higher mountains where growing seasons are short and soils shallow and rocky. An acre of well-stocked forest land in the high mountains grows less than a third of the volume of wood that an acre in the lower elevations can grow. Once logged, these high mountain sites may be difficult or impossible to reforest. Pictured are the Enchantment Lakes, Snow Lakes, and Mount Stuart, near Wenatchee, Washington, part of an area being studied for possible Wilderness classification.

CHANGES IN OWNERSHIP OF COMMERCIAL FOREST AREA

The pattern of forest ownership has changed considerably in many parts of the Northwest since early settlement and continues to change. Since 1953 these general changes were noted.

National Forests have had an active land exchange program whereby they have consolidated some of their holdings. They have also acquired land from other Government agencies and private landowners. In Washington they have acquired about 12,000 acres. In Oregon they have acquired over 500,000 acres, most of which came from the terminated Klamath Indian Reservation.

Though the trend in Washington has changed recently, Indian lands had been going into private holdings, and Bureau of Land Management lands had been going into State and private ownership.

Commercial forest land owned by forest industry has increased an estimated 500,000 acres in Oregon and Washington, mostly between the early 1950's and mid-1960's. These lands were formerly held by miscellaneous private owners that did not qualify as forest industry by Forest Survey standards (i.e., they did not operate a forest products mill), by farmers, and by various public agencies. Included were some tax-delinquent lands held by the counties. Over 60,000 acres of Indian lands were acquired by forest industry, mostly from the Klamath Indian Reservation.

Farmer-owned commercial forest area has decreased in both Oregon and Washington, the lands going into miscellaneous private and forest industry holdings. Miscellaneous owners include large industrial concerns, land development companies, corporate farms, and thousands of individuals who own land for homesites, recreational use, or speculation. In many areas, land development companies have bought farmer-owned lands, subdivided them into smaller parcels, and offered them for sale for home or recreational sites. At this time, a very large area of these subdivided tracts remain unsold, and many that are sold have not been developed (fig. 11). It remains to be seen what will happen to them.

Figure 11.--A large area of forest land has been subdivided into small tracts.

SOURCE OF INFORMATION

The basic information on changes in commercial forest land area between 1953 and 1970 came from these sources:

National Forest lands. --Information was provided by the Regional Offices in Portland, Oregon; Missoula, Montana (for northeastern Washington); and San Francisco, California (for the Oregon portion of the Klamath National Forest), and by the timber management and lands divisions of the various National Forest Supervisors' Offices.

Bureau of Land Management lands, western Oregon. --Information was provided by the State Bureau of Land Management office in Portland and used to supplement information from Forest Survey plots on Bureau of Land Management land.

Private and all other public lands. --The Forest Survey project has established about 6,600 permanent plots, 1 acre in size, in a grid pattern throughout the forested areas of Oregon and Washington. These plots are on all lands except National Forests, National Parks, State parks, and county and municipal parks. The plots were examined at different points of time either on the ground or from aerial photographs. Both changes from forest to nonforest and from nonforest to forest were noted and recorded by ownership classes as determined from county assessor ownership records.

Information on changes in forest area set aside for Parks, Wildernesses, and other reservations was obtained from various agencies, including those mentioned above. Information on changes in forest ownership came from various land-owning agencies, as well as county assessor records examined at different points in time.

Information on forest area changes before 1953 came from data compiled for the Timber Resource Review.[4]

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[4] *Forest Service, U.S. Department of Agriculture. Timber resources for America's future. Forest Resource Report No. 14, 713 p., Washington, D.C., 1958.*

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Bolsinger, Charles L.
1973. Changes in commercial forest area in Oregon and Washington, 1945-70. USDA Forest Serv. Resource Bull. PNW-46, 16 p., illus. Pacific Northwest Forest & Range Experiment Station, Portland, Oregon.

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2. Development and evaluation of alternative methods and levels of resource management.
3. Achievement of optimum sustained resource productivity consistent with maintaining a high quality forest environment.

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USDA Forest Service Resource Bulletin PNW-47

AREAS OF NONFOREST AND NONCOMMERCIAL FOREST LANDS by COVER TYPE and by TOPOGRAPHIC SITE for INTERIOR ALASKA

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ABSTRACT

Previously unreported land-cover data obtained during a 1957-62 forest inventory of 229 million acres of interior Alaska are given. Tables have been prepared for 10 subunit divisions showing area of noncommercial land by topographic site and nonforest land by eight different ecosystems. A brief description is given of methodology and terminology.

Keywords: Land classification, forest surveys, interior Alaska.

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INTRODUCTION

During 1957 to 1962, an initial reconnaissance inventory was made of interior Alaska forests. This inventory employed a three-stage sampling design of photo interpretation on 1:5,000-scale strip photography, air checks, and ground samples that were generally restricted to commercial forest locations.[1/] The inventory provided the first comprehensive data for 229 million acres of Alaska's interior considered to have commercial forest potential. Results of the inventory are reported in Resource Bulletin PNW-19.[2/]

Since the release of the resource bulletin, increasing interest in total land planning has shown the need for more land classification information than was originally reported. This is particularly true for the nonforest and noncommercial forest lands. Our original photo interpretation identified various subclasses within these broad groupings, but in the published report only major land classes were shown. This paper complements Resource Bulletin PNW-19 in reporting data for subclasses as well as the major land classes.

TERMINOLOGY

The basic Forest Survey land classes,[3/] the subclasses used in photo interpretation (many of the land and forest cover types listed are illustrated[4/ 5/]), and other terms used in the tables are as follows.

Land area.--The area of dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area.

Water area.--Separated into two classes as defined below. The boundary between land and water was taken to be the high waterline or, in the case of salt water, the mean high tide line.

Census water: water bodies more than 40 acres in size and streams more than 1/8 mile wide (to high waterline).

Noncensus water: water bodies more than 1 but less than 40 acres in size and streams more than 120 feet but less than 1/8 mile wide.

1/ R. C. Wilson. Working plan for the forest survey of interior Alaska. USDA For. Serv. Div. For. Econ. Res., Washington, D.C., 1957. (Unpub. rep.)

2/ O. Keith Hutchison. Alaska's forest resource. USDA For. Serv. Resour. Bull. PNW-19, 74 p., illus., 1967. Pac. Northwest For. & Range Exp. Stn., Portland, Oreg.

3/ USDA Forest Service. FSH 4800 Forest Service Handbook, 1960.

4/ H. J. Lutz and A. P. Caporaso. Indicators of forest land classes in aerial photo interpretation of the Alaskan interior. Alaska For. Res. Cent. Stn. Pap. 10, 31 p., illus., 1958.

5/ Karl M. Hegg. A photo identification guide for the land and forest types of interior Alaska. USDA For. Serv. Res. Pap. NOR-3, 55 p., illus., 1967. North. For. Exp. Stn.

Forest cover type.-- A classification of forest land based upon predominant species by gross volume in the present tree cover (board feet for sawtimber, cubic feet for poletimber, or the predominant crown cover in seedling and sapling stands).

Offsite.-- Sites supporting commercial tree species but with trees of such poor form that there is little or no potential for a future forest product.

Stocking classes.--Based on crown closure of all trees. Stocking is the extent to which growing space is effectively utilized by present or potential growing stock trees.

Well-stocked:	70 percent or more stocked
Medium-stocked:	40-69 percent stocked
Poorly stocked:	10-39 percent stocked
Nonstocked:	less than 10 percent stocked but having evidence of previous forest cover.

Forest land.--Land at least 10 percent stocked by forest trees of any size, or formerly having such tree cover, and not currently developed for nonforest use.

Commercial forest land: Forest land which is producing or is capable of producing crops of industrial wood and is not withdrawn from timber utilization. Includes lands of site quality capable of producing more than 20 cubic feet per acre annually.

Noncommercial forest land: Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions and productive forest land withdrawn from commercial timber use through statute or administrative regulation. Three subclasses were recognized within this cover class.

Noncommercial spruce - short, slow-growing, open-to-dense stands of spruce (generally black spruce) on cold, wet, poorly drained sites. Mostly on level or gently inclined sites, but also occurring on north-facing slopes north and west of the Alaska Range and within the Copper River Basin. Also found on somewhat better sites where restricted drainage and permafrost limit the tree growth to less than commercial.

Subalpine - open stand of stunted, deformed trees, generally white spruce intermixed with black spruce and occasionally balsam poplar; an alpine and/or mountain noncommercial type usually occurring above 2,500-foot elevation in central Alaska but at elevations as low as 500 feet in western Alaska and northerly latitudes. Quite often this type will have considerable per-acre cubic volume but little board-foot volume because of the rapid taper of the trees.

Other - open to dense stands of "offsite" aspen and balsam poplar. Occurs on dry, south-facing, steep slopes (45 to 50 percent and greater) and on overdrained river gravel bars. In the Copper River valley this class also includes spruce on rocky, steep slopes. Trees on these sites are unusually short (15 to 35 feet) with large crowns.

Topographic site.-- All forest types, in the noncommercial strata, were assigned one of the following combinations of topographic site classifications: Drained level, drained slope, wet level, wet slope, or subalpine for those sites considered to be chiefly influenced by high elevations.

Level sites: slopes less than 3 percent.

Slope sites: slopes 3 percent or more.

Wet sites: those in which subsurface drainage is restricted to the upper 18 inches of soil mantle. Evidences of wet sites observable on aerial photos are pure stands of noncommercial black spruce type, high stem density with variable heights, standing water, and the scarcity or absence of aspen and cottonwood trees. In the permafrost zone, surface indicators of poor drainage include frost polygons, beaded drainage patterns, thaw lakes, thermokarsts, and slumping. Although no single indicator may be reliable, a combination of two or more indicators is reasonably so.

Drained sites: those in which subsurface drainage is not restricted to the upper 18 inches of the soil mantle. Some indicators of drained sites are the absence of muskeg-type vegetation or standing water, a preponderance of hardwoods, and generally medium- to well-stocked forest stands. Although no single indicator may be reliable, a combination of two or more indicators of drained forest sites is reasonably reliable.

Nonforest land.--Land that does not qualify as forest land. Includes land that has never supported forests and lands formerly forested where forest use is precluded by development for nonforest uses, such as crops, improved pasture, residential areas, and city parks. Also includes improved roads and certain areas of water classified by the U. S. Bureau of the Census as land. Unimproved roads, streams, canals, and nonforest strips in forest areas must be more than 120 feet wide, and clearings in forest areas must be more than 1 acre in size, to qualify as nonforest land.

Urban-agricultural: villages, towns, farms, and rights-of-way.

Dry meadow: upland, grassy. May contain some shrubs. Type includes lichen- and moss-covered slopes. Boundary of type crosses contour line.

Wet meadow: grass, sedge, moss tussock type, and sphagnum swamps. May contain low shrubs and trees. Commonly bordered by stands of short black spruce. Generally, borders of this type follow the contour. Tundra areas with numerous potholes and with indications of frost polygons and soil slumping have been classed in this type.

Dwarf shrub: less than 4 feet in height. Species composition is chiefly bog birch and blueberry. Prostrate forms of willow and alder occur at higher and more exposed locations.

Tall shrub: includes willow and alder exceeding 4 feet in height. Usually with very high density. Occurs on both upland and lowland situations.

Barren: majority of the area has no vegetation. Generally, rocky or gravelly or recently built-up river bars. Stocking of trees is less than 10 percent.

Glaciers, ice, and snowfields: chiefly occupied by ice or snow and appearing of a permanent nature. This type includes considerable areas of "barren." Our

original 10 units were delineated by heights of land between major drainages. Within these units, large areas were obviously incapable of supporting vegetative growth and were excluded in total from our photo sample. These exclusion areas are a mixture of barren and glacier and icefield, all classified in the glacier-icefield stratum.

TABLES

The tables have been developed from proportions obtained through photo interpretation. The proportions by cover type within each major land class were not corrected by ground samples, although the major land class acreages of commercial forest, noncommercial forest, and nonforest were adjusted as part of the original sampling procedure.

Data are provided for 10 units (see fig. 1) but should be used with some caution. The original inventory was designed to sample the 229-million-acre interior area as a single unit, and the subunit acreages cannot be given a sampling error. In addition, the sample of discrete items such as towns, highways, and lakes may be weak--particularly by subunit. Our sample was taken from strip photography at 30-mile intervals and easily could have missed sharply defined areas. As an example, Tustumena and Skilak Lakes in the Kenai unit were between flight strips and their combined areas were nearly three times greater than the census water area assigned that unit.

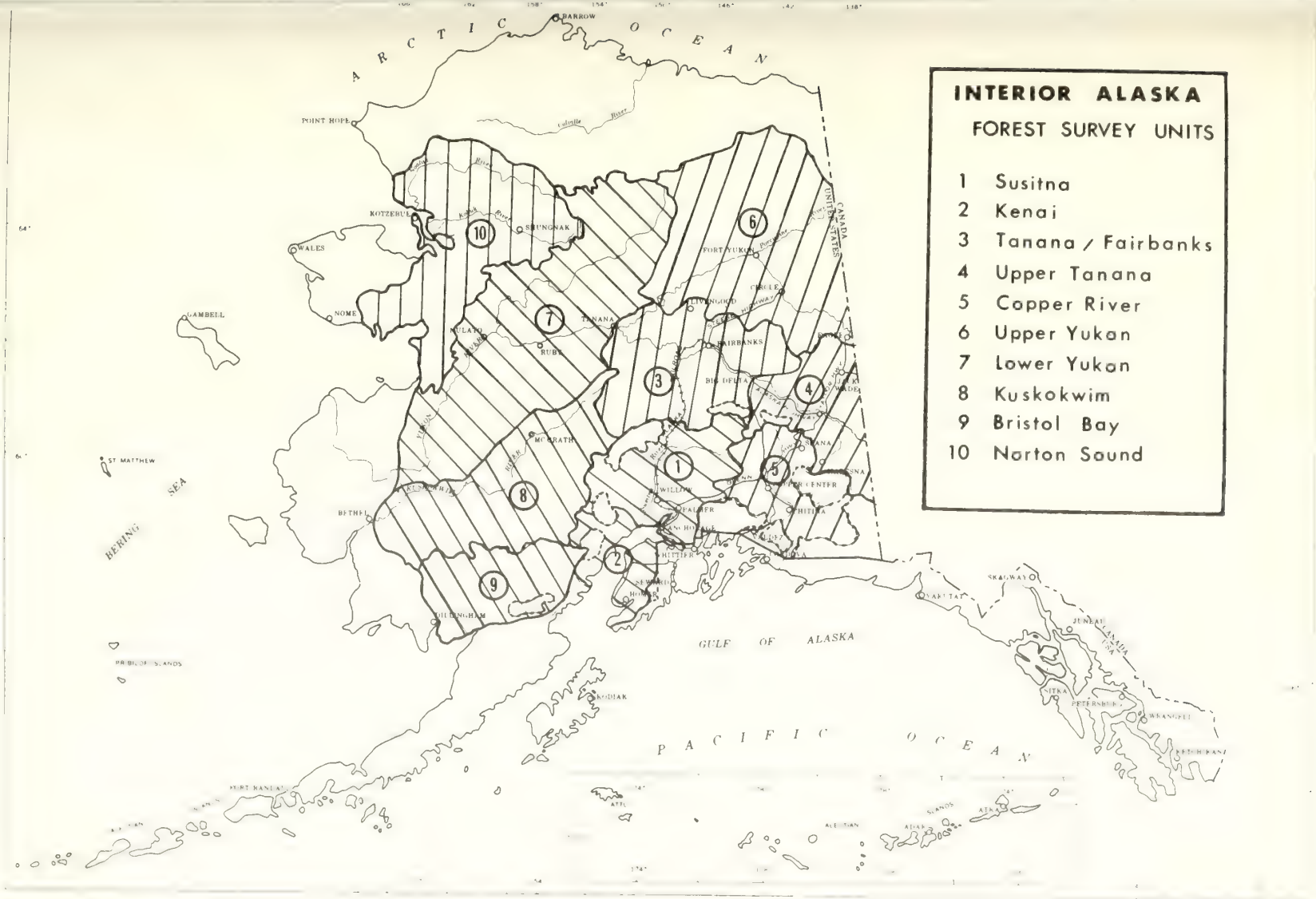

Figure 1.--*The exterior boundary of these Forest Survey units indicates the approximate limit of commercial tree growth in the interior. The diagonal lines indicate the approximate location of flight lines to obtain the aerial photography used for the interior forest inventory.*

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Table 1.--*Land areas in interior Alaska, by major class of land and survey unit*

(Thousand acres)[1/]

Survey unit	Total land area	Forest land			Nonforest
		Total	Commercial	Noncommercial	
Susitna	16,490	4,292	2,023	2,269	12,198
Kenai	5,544	2,070	1,481	589	3,474
Tanana/Fairbanks	20,266	12,989	3,561	9,428	7,277
Upper Tanana	13,633	6,746	1,272	5,474	6,887
Copper River	16,424	4,431	1,060	3,371	11,993
Upper Yukon	36,928	22,557	4,945	17,612	14,371
Lower Yukon	44,975	30,005	4,232	25,773	14,970
Kuskokwim	26,564	14,662	2,594	12,068	11,902
Bristol Bay	12,877	2,741	704	2,037	10,136
Norton Sound	31,113	5,311	603	4,708	25,802
Total	224,814	105,804	22,475	83,329	119,010
Unsurveyed area	107,741	--	--	--	107,741
Total interior	332,555	105,804	22,475	83,329	226,751

[1/] 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

Table 2.--*Area of noncommercial forest land by local cover type and by topographic site, all units, Alaska*

(Thousand acres)[1/]

Topographic site	Total	Cover type		
		Spruce	Subalpine	Other
Drained level	572	326	--	246
Drained slope	3,890	2,299	--	1,591
Wet level	11,321	11,181	--	140
Wet slope	59,227	58,983	--	244
Subalpine	8,319	--	8,319	--
Total	83,329	72,789	8,319	2,221

[1/] 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

Table 3.--*Area of noncommercial forest land by local cover type and by topographic site, Susitna unit 1, Alaska*
(Thousand acres)[1/]

Topographic site	Total	Cover type		
		Spruce	Subalpine	Other
Drained level	17	11	--	6
Drained slope	238	142	--	96
Wet level	397	397	--	0
Wet slope	857	857	--	0
Subalpine	760	--	760	--
Total	2,269	1,407	760	102

[1/] 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

Table 4.--*Area of noncommercial forest land by local cover type and by topographic site, Kenai unit 2, Alaska*
(Thousand acres)[1/]

Topographic site	Total	Cover type		
		Spruce	Subalpine	Other
Drained level	0	0	--	0
Drained slope	49	14	--	35
Wet level	222	222	--	0
Wet slope	235	235	--	0
Subalpine	83	--	83	--
Total	589	471	83	35

[1/] 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

Table 5.--*Area of noncommercial forest land by local cover type and by topographic site, Tanana/Fairbanks unit 3, Alaska*
(Thousand acres)[1/]

Topographic site	Total	Cover type		
		Spruce	Subalpine	Other
Drained level	166	58	--	108
Drained slope	223	115	--	108
Wet level	1,871	1,864	--	7
Wet slope	6,297	6,283	--	14
Subalpine	871	--	871	--
Total	9,428	8,320	871	237

[1/] 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

Table 6.--*Area of noncommercial forest land by local cover type and by topographic site, Upper Tanana unit 4, Alaska*
(Thousand acres)[1/]

Topographic site	Total	Cover type		
		Spruce	Subalpine	Other
Drained level	6	6	--	0
Drained slope	68	11	--	57
Wet level	625	597	--	28
Wet slope	3,127	3,121	--	6
Subalpine	1,648	--	1,648	--
Total	5,474	3,735	1,648	91

[1/] 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

Table 7.--*Area of noncommercial forest land by local cover type and by topographic site, Copper River unit 5, Alaska*
(Thousand acres)[1/]

Topographic site	Total	Cover type		
		Spruce	Subalpine	Other
Drained level	0	0	--	0
Drained slope	95	54	--	41
Wet level	1,098	1,092	--	6
Wet slope	1,537	1,531	--	6
Subalpine	641	--	641	--
Total	3,371	2,677	641	53

[1/] 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

Table 8.--*Area of noncommercial forest land by local cover type and by topographic site, Upper Yukon unit 6, Alaska*
(Thousand acres)[1/]

Topographic site	Total	Cover type		
		Spruce	Subalpine	Other
Drained level	66	66	--	0
Drained slope	815	528	--	287
Wet level	2,150	2,143	--	7
Wet slope	12,453	12,365	--	88
Subalpine	2,128	--	2,128	--
Total	17,612	15,102	2,128	382

[1/] 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

Table 9.--*Area of noncommercial forest land by local cover type and by topographic site, Lower Yukon unit 7, Alaska*
(Thousand acres)[1/]

Topographic site	Total	Cover type		
		Spruce	Subalpine	Other
Drained level	13	13	--	0
Drained slope	400	200	--	200
Wet level	2,338	2,338	--	0
Wet slope	22,739	22,687	--	52
Subalpine	283	--	283	--
Total	25,773	25,238	283	252

[1/] 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

Table 10.--*Area of noncommercial forest land by local cover type and by topographic site, Kuskokwim unit 8, Alaska*
(Thousand acres)[1/]

Topographic site	Total	Cover type		
		Spruce	Subalpine	Other
Drained level	30	6	--	24
Drained slope	543	112	--	431
Wet level	1,245	1,227	--	18
Wet slope	8,869	8,834	--	35
Subalpine	1,381	--	1,381	--
Total	12,068	10,179	1,381	508

[1/] 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

Table 11.--*Area of noncommercial forest land by local cover type and by topographic site, Bristol Bay unit 9, Alaska*
(Thousand acres)[1/]

Topographic site	Total	Cover type		
		Spruce	Subalpine	Other
Drained level	167	148	--	19
Drained slope	654	537	--	117
Wet level	741	667	--	74
Wet slope	401	358	--	43
Subalpine	74	--	74	--
Total	2,037	1,710	74	253

[1/] 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

Table 12.--*Area of noncommercial forest land by local cover type and by topographic site, Norton Sound unit 10, Alaska*
(Thousand acres)[1/]

Topographic site	Total	Cover type		
		Spruce	Subalpine	Other
Drained level	107	18	--	89
Drained slope	805	586	--	219
Wet level	634	634	--	0
Wet slope	2,712	2,712	--	0
Subalpine	450	--	450	--
Total	4,708	3,950	450	308

[1/] 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

Table 13.--*Percent of total noncommercial forest land by local cover type and survey unit, Alaska*

Survey unit	Total	Cover type		
		Spruce	Subalpine	Other
1	2.7	1.7	0.9	0.1
2	.7	.6	.1	(1/)
3	11.3	10.0	1.0	.3
4	6.6	4.5	2.0	.1
5	4.1	3.2	.8	.1
6	21.1	18.1	2.6	.4
7	30.9	30.3	.3	.3
8	14.5	12.2	1.7	.6
9	2.4	2.0	.1	.3
10	5.7	4.8	.5	.4
Total	100.0	87.4	10.0	2.6

1/ Negligible.

Table 14.--*Percent of total noncommercial forest land*[1/] *by topographic site and survey unit, Alaska*

Survey unit	Total noncommercial forest land[2/]	Topographic site				
		Drained		Wet		Subalpine
		Level	Slope	Level	Slope	
1	2.7	(3/)	0.3	0.4	1.0	0.9
2	.7	0	.1	.3	.3	.1
3	11.3	.2	.3	2.2	7.6	1.0
4	6.6	(3/)	.1	.8	3.7	2.0
5	4.1	0	.1	1.3	1.9	.8
6	21.1	.1	1.0	2.6	14.9	2.6
7	30.9	(3/)	.5	2.8	27.3	.3
8	14.5	(3/)	.6	1.5	10.6	1.7
9	2.4	.2	.8	.9	.5	.1
10	5.7	.1	.9	.8	3.3	.5
Total	100.0	.6	4.7	13.6	71.1	10.0

1/ Noncommercial forest land totals 83,329,400 acres.

2/ Because of rounding some rows and columns do not balance.

3/ Negligible.

Table 15.--*Area and percent distribution of nonforest land by local cover type and survey unit, Alaska*

Survey unit		Total	Local type							
			Urban-agric.	Dry meadow	Wet meadow	Tall shrub	Dwarf shrub	Barren	Glacier, icefields	Water[1/]
Susitna (1)	M acres	12,198	110	2,547	282	1,880	1,047	2,804	3,366	162
	Percent	10.25	.09	2.14	.24	1.58	.88	2.35	2.83	.14
Kenai (2)	M acres	3,474	10	247	228	608	180	622	1,558	20
	Percent	2.92	.01	.21	.19	.51	.15	.52	1.31	.02
Tanana/Fairbanks (3)	M acres	7,277	12	1,341	255	1,875	1,283	1,532	907	72
	Percent	6.11	.01	1.13	.21	1.57	1.08	1.29	.76	.06
Upper Tanana (4)	M acres	6,887	--	929	51	1,657	1,152	1,261	1,765	72
	Percent	5.79	--	.78	.04	1.40	.97	1.06	1.48	.06
Copper River (5)	M acres	11,993	13	1,422	107	1,213	341	2,205	6,497	195
	Percent	10.08	.01	1.19	.09	1.02	.29	1.86	5.46	.16
Upper Yukon (6)	M acres	14,371	6	4,737	468	2,396	2,741	3,548	25	450
	Percent	12.07	< .01	3.98	.39	2.01	2.30	2.98	.02	.38
Lower Yukon (7)	M acres	14,970	6	3,390	1,771	4,943	2,356	1,808	12	684
	Percent	12.58	< .01	2.85	1.49	4.15	1.98	1.52	.01	.57
Kuskokwim (8)	M acres	11,902	13	2,502	2,791	1,125	2,194	2,163	797	317
	Percent	10.00	< .01	2.10	2.35	.95	1.84	1.82	.67	.26
Bristol Bay (9)	M acres	10,136	6	1,304	5,631	974	347	1,365	144	365
	Percent	8.52	< .01	1.10	4.73	.82	.29	1.15	.12	.31
Norton Sound (10)	M acres	25,802	0	9,617	6,943	2,643	3,267	2,900	0	432
	Percent	21.68	--	8.08	5.84	2.22	2.75	2.43	--	.36
Total	M acres	119,010	176	28,036	18,527	19,314	14,909	20,208	15,071	2,769
	Percent	100.0	.15	23.56	15.57	16.23	12.53	16.98	12.66	2.32

[1/] 1-40 acres.

NOTE: 1 acre equals 0.4047 hectare or 1 hectare equals 2.47 acres.

☆GPO 798-153

Hegg, Karl M., and Ronald M. Dippold
1973. Areas of nonforest and noncommercial forest land by cover types and by topographic site for interior Alaska. USDA For. Serv. Resour. Bull. PNW-47, 15 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

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The mission of the PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION is to provide the knowledge, technology, and alternatives for present and future protection, management, and use of forest, range, and related environments.

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1. Providing safe and efficient technology for inventory, protection, and use of resources.
2. Development and evaluation of alternative methods and levels of resource management.
3. Achievement of optimum sustained resource productivity consistent with maintaining a high quality forest environment.

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The FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

USDA Forest Service
Resource Bulletin PNW-48

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1972 WASHINGTON TIMBER HARVEST

by
J. D. Lloyd, Jr., *Supervisory Forester*

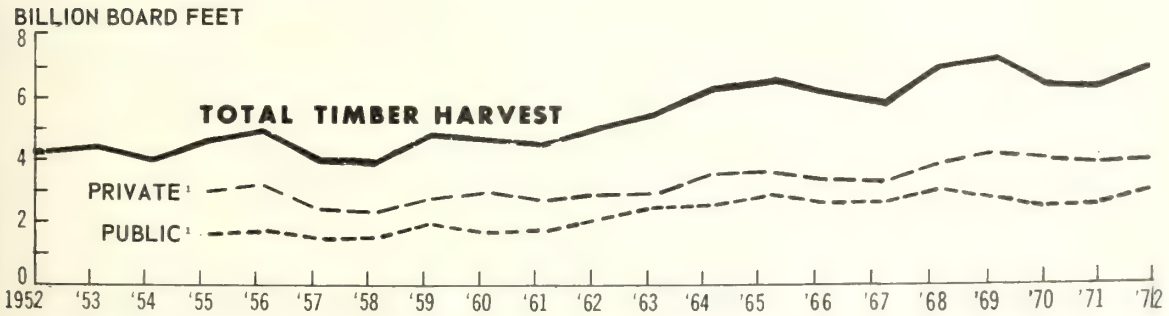
Washington's 1972 timber harvest increased 629 million board feet to 7.08 billion board feet, 9.8 percent above 1971. This was the highest level of production since 1929 when the record was established at 7.38 billion board feet.

Public agencies accounted for nearly all the increase with a gain of 22 percent for a total harvest of 3.1 billion board feet. The greatest portion of the increase was on State lands which had an increase of 282 million board feet or 39 percent for a record harvest of 1,004 million board feet. This was accompanied by a decrease in State uncut volume under contract of 400 million board feet (or 25 percent) between yearend 1971 and 1972. Harvest on National Forests increased 226 million board feet (or 18 percent), whereas their uncut volume under contract decreased 556 million board feet (or 14 percent).

The total 1972 private timber harvest increased only 69 million board feet (up 2 percent) from that of 1971. All of this increase can be attributed to the other private ownerships (up 35 percent), whereas the production on industrial private lands declined 4 percent. Other private production increased in both western and eastern Washington 28 percent and 73 percent, respectively. Industrial private production declined 3 percent in western Washington and 36 percent in eastern Washington between 1971 and 1972.

The average annual stumpage prices in 1972 on publicly owned or managed lands increased 90 percent in western Washington and 65 percent in eastern Washington above the 1971 prices. Volume sold on all public lands during 1972 increased 3 percent. The volume sold on National Forests increased 9 percent, and the volume sold on State lands decreased 8 percent compared with 1971.

WASHINGTON TIMBER HARVEST 1952-72



[1]Separate data for public and private not available prior to 1955.

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION

Robert E. Buckman, *Director*
FOREST SERVICE

P.O. Box 3141 , Portland, Oregon 97208
U.S. Department of Agriculture

Timber Harvest by Ownership in the State of Washington, 1972[1/]

(In thousand board feet, Scribner log scale)

Half-State and county	Private[2/]						State[2/]		Bureau of Land Management[4/]		National Forests[4/]		Indian lands[4/]		Other public[2/]		Other Federal[2/5/]		Total production
	Industrial		Other		Total private														
	Live	Dead[3/]	Live	Dead[3/]	Live	Dead[3/]	Live	Dead[3/]	Live	Dead[3/]	Live	Dead[3/]	Live	Dead[3/]	Live	Dead[3/]	Live	Dead[3/]	
Western Washington:																			
Clallam	156,508	--	37,440	378	193,948	378	90,324	696	--	--	58,192	3,558	3,960	--	100	--	--	--	351,156
Clark	8,941	--	9,752	--	18,693	--	4,439	105	--	--	--	--	--	--	910	--	--	--	24,147
Cowlitz	668,580	--	16,945	67	685,525	67	122,745	558	--	--	1,930	1,104	--	--	23	--	1,402	--	813,354
Grays Harbor	233,327	--	42,331	342	275,658	342	5,556	241	--	--	85,771	8,200	153,967	--	27,217	--	--	--	556,952
Island	1,837	--	16,698	--	18,535	--	--	--	--	--	--	--	--	--	--	--	485	--	19,020
Jefferson	120,267	--	42,625	22	162,892	22	402,721	3,819	--	--	39,404	674	--	--	20	--	248	--	609,800
King	257,909	--	109,723	--	367,632	--	34,554	124	110	--	69,192	7,796	104	--	21,915	--	--	--	501,427
Kitsap	2,634	--	26,231	--	28,865	--	2,405	1	--	--	--	--	685	--	2,069	--	1,236	--	35,261
Lewis	415,389	50	78,427	129	493,816	179	40,737	199	--	--	109,311	7,913	--	--	--	--	--	--	652,155
Mason	35,546	--	28,317	--	63,863	--	7,910	35	--	--	56,849	23,146	--	--	--	--	--	--	151,803
Pacific	448,551	--	18,058	65	466,609	65	29,366	134	--	--	--	--	--	--	--	--	80	--	496,254
Pierce	209,197	--	55,091	--	264,288	--	22,956	90	--	--	49,131	7,876	--	--	--	--	8,338	--	352,679
San Juan	1,261	--	3,451	830	4,712	830	--	--	--	--	--	--	--	--	--	--	--	--	5,542
Skagit	133,228	100	23,064	--	156,292	100	46,880	223	--	--	84,765	8,870	--	--	50	--	--	--	297,180
Skamania	29,308	330	44,787	--	74,095	330	21,058	100	--	--	222,953	59,853	--	--	25	--	--	--	378,414
Snohomish	104,980	--	35,335	40	140,315	40	43,705	189	--	--	66,685	11,227	--	--	406	--	--	--	262,567
Thurston	67,957	--	55,572	64	123,529	64	3,184	54	--	--	--	--	--	--	--	--	4,015	--	130,846
Wahkiakum	107,106	3	4,250	7	111,356	10	17,106	74	--	--	--	--	--	--	3,396	--	1,375	--	133,317
Whatcom	64,398	--	11,626	--	76,024	--	20,829	76	--	--	18,988	2,414	--	--	--	--	--	--	118,331
Total	3,066,924	483	659,723	1,944	3,726,647	2,427	916,475	6,718	110	--	863,171	142,631	158,716	--	56,131	--	17,179	--	5,890,205
Total live and dead	3,067,407		661,667		3,729,074		923,193		110		1,005,802		158,716		56,131		17,179		5,890,205
Eastern Washington:																			
Adams	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Asotin	--	--	2,945	--	2,945	--	--	--	--	--	2,709	--	--	--	--	--	--	--	5,654
Benton	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chelan	5,716	--	2,109	--	7,825	--	247	27	306	--	34,104	58,270	--	--	172	--	--	--	100,951
Columbia	498	--	1,904	--	2,402	--	--	--	--	--	7,695	716	--	--	--	--	--	--	10,813
Douglas	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ferry	5,522	47	4,373	--	9,895	47	7,861	212	415	--	27,266	500	96,546	2,920	--	--	--	--	145,662
Franklin	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Garfield	636	--	2,737	--	3,373	--	11	--	--	--	8,274	48	--	--	--	--	--	--	11,706
Grant	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Kittitas	8,989	--	46,747	76	55,736	76	1,558	--	--	--	69,122	1,789	--	--	--	--	--	--	128,281
Klickitat	41,479	216	8,164	60	49,643	276	23,014	831	--	--	2,244	--	9,632	315	--	--	--	--	85,955
Lincoln	--	--	4,282	--	4,282	--	220	8	--	--	--	--	--	--	--	--	--	--	4,510
Okanogan	4,713	--	15,850	--	20,563	--	24,413	19	--	--	110,483	1,365	40,735	285	--	--	--	--	197,863
Pend Oreille	15,868	--	15,955	--	31,823	--	5,367	17	--	--	70,123	--	--	--	--	--	--	--	107,330
Spokane	4,320	--	18,360	--	22,680	--	275	--	--	--	--	--	--	--	656	--	--	--	23,611
Stevens	24,655	433	32,080	170	56,735	603	12,733	161	1,712	--	7,578	1,274	22,018	2,181	--	140	1,914	--	107,049
Walla Walla	832	--	1,047	--	1,879	--	--	--	--	--	--	--	--	--	--	--	--	--	1,879
Whitman	--	--	805	--	805	--	--	--	--	--	--	--	--	--	--	--	--	--	805
Yakima	3,254	--	10,745	125	13,999	125	3,460	--	--	--	62,581	15,618	127,577	27,737	6,150	--	--	--	257,247
Total	116,482	696	168,103	431	284,585	1,127	79,159	1,275	2,433	--	402,179	79,580	296,508	33,438	6,978	140	1,914	--	1,189,316
Total live and dead	117,178		168,534		285,712		80,434		2,433		481,759		329,946		7,118		1,914		1,189,316
Total Washington	3,183,406	1,179	827,826	2,375	4,011,232	3,554	995,634	7,993	2,543	--	1,265,350	222,211	455,224	33,438	63,109	140	19,093	--	7,079,521
Total live and dead	3,184,585		830,201		4,014,786		1,003,627		2,543		1,487,561		488,662		63,249		19,093		7,079,521

1/ Includes volume in logs, poles, piling, shingle bolts, etc.

2/ Compiled by the Washington State Department of Natural Resources.

3/ Includes snags and down material existing prior to initial logging.

4/ Compiled by respective agencies, U.S. Bureau of Land Management, U.S. Forest Service, U.S. Bureau of Indian Affairs.

5/ Includes lands logged under jurisdiction of U.S. Department of Interior--Bonneville Power Administration, National Park Service, Bureau of Sport Fisheries and Wildlife; and U.S. Department of the Army.

Prepared by Forest Survey Project, Pacific Northwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture, Portland, Oregon.

USDA Forest Service
Resource Bulletin PNW-49

September 1973

1972 OREGON TIMBER HARVEST

by

J. D. Lloyd, Jr., *Supervisory Forester*

The 1972 Oregon timber harvest of 9.6 billion board feet was 602 million board feet (6.7 percent) above the 1971 harvest. Western Oregon's harvest rose 8 percent and eastern Oregon's harvest rose 2 percent.

The increase in total harvest in 1972 was all on public lands--21 percent in western Oregon and 13 percent in eastern Oregon. The harvest on National Forest lands increased 747 million board feet (23 percent) to a record 3.9 billion board feet. Harvest on State lands increased 88 million board feet (56 percent) and on Bureau of Land Management lands, 79 million board feet (6 percent).

The 1972 total private timber harvest was 7 percent below the 1971 production, with western Oregon declining 5 percent and eastern Oregon declining 16 percent. Total harvest on forest industry lands decreased 8 percent; other private lands' harvest decreased 5 percent.

Average stumpage prices on publicly owned or managed lands increased over the 1971 averages by 55 percent in western Oregon and 72 percent in eastern Oregon. The total volume of public stumpage sold increased less than 1 percent; however, the volume cut exceeded the volume sold by 14 percent. The volume of uncut timber under contract on National Forest, Bureau of Land Management, and State lands in Oregon decreased 3.6 percent, compared with 1971, to 9,979 million board feet.

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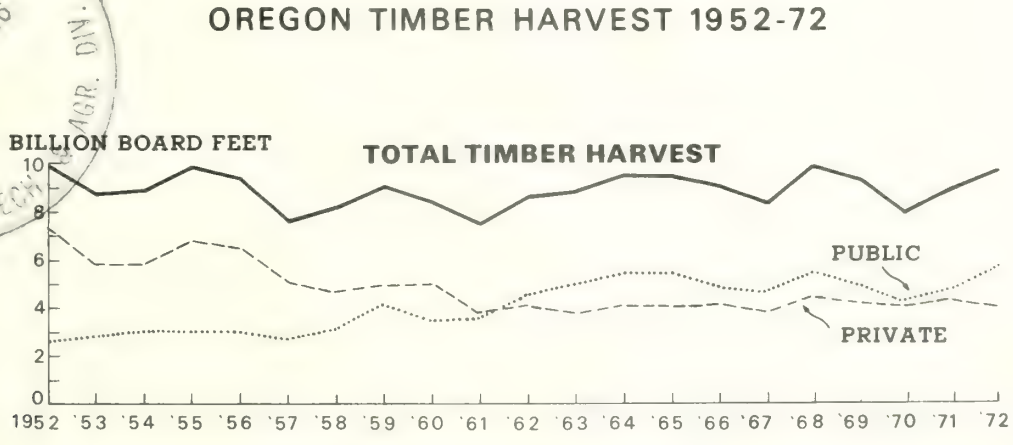

OREGON TIMBER HARVEST, 1952–72

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION

Robert E. Buckman, Director
FOREST SERVICE

P.O. Box 3141 Portland, Oregon 97208
U.S. Department of Agriculture

Timber Harvest by Ownership in the State of Oregon, 1972[1/]

(In thousands of board feet, Scribner log scale)

State and county	Private[2/]			Bureau of Land Management[3/]	National Forest[4/]	Indian[5/]	Other Federal[2/]	State[2/]	Other public[2/]	Total
	Forest industry	Other	Total							
Western Oregon:										
Benton	15,608	24,200	39,808	58,076	17,728	--	--	9,171	--	124,783
Clackamas	108,064	7,496	115,560	51,082	267,938	--	--	2,395	--	436,975
Clatsop	227,901	15,720	243,621	--	--	--	--	54,310	--	297,931
Columbia	66,575	18,713	85,288	3,320	--	--	--	3,181	1,721	93,510
Coos	375,799	24,529	400,328	141,287	56,401	--	--	42,296	3,095	643,407
Curry	75,462	9,571	85,033	24,150	169,863	--	--	1,909	--	280,955
Douglas	625,042	83,631	708,673	382,865	467,210	--	--	19,706	--	1,578,454
Hood River	15,746	2,782	18,528	--	34,911	--	--	2,072	6,625	62,136
Jackson	191,010	11,616	202,626	149,549	205,828	--	2,900	--	--	560,903
Josephine	1,575	7,109	8,684	113,720	70,497	--	--	--	1,515	194,416
Lane	559,088	51,404	610,492	224,292	851,369	--	--	10,771	175	1,697,099
Lincoln	88,699	12,493	101,192	23,707	121,927	--	--	24,612	20	271,458
Linn	269,241	121,692	390,933	91,042	198,449	--	--	7,405	--	687,829
Marion	11,567	4,171	15,738	5,428	64,744	--	--	6,284	--	92,194
Multnomah	1,200	653	1,853	--	18,992	--	--	--	--	20,845
Polk	41,813	11,767	53,580	23,801	2,928	--	--	14,029	--	94,338
Tillamook	101,595	820	102,415	46,895	67,168	--	--	36,095	--	252,573
Washington	1,405	8,835	10,240	385	--	--	--	1,440	1,200	13,265
Yamhill	14,516	5,201	19,717	45,759	8,036	--	--	17	4,342	77,871
Total	2,791,906	422,403	3,214,309	1,385,358	2,623,989	--	2,900	235,693	18,693	7,480,942
Eastern Oregon:										
Baker	1,147	3,805	4,952	1,844	88,297	--	--	--	--	95,093
Crook	4,194	2,775	6,969	1,942	72,352	--	--	--	--	81,263
Deschutes	13,147	--	13,147	--	88,265	--	--	--	--	101,412
Gilliam	--	--	--	--	--	--	--	--	--	--
Grant	23,540	18,734	42,274	3,707	263,399	--	--	--	--	309,380
Harney	851	246	1,097	36	74,933	--	--	1,075	--	77,141
Jefferson	10,782	1,093	11,875	--	18,886	13,669	--	--	--	44,430
Klamath	284,265	13,317	297,582	25,710	226,667	--	--	4,477	235	554,671
Lake	191,839	12,624	204,463	--	136,945	--	--	--	--	341,408
Malheur	--	--	--	--	--	--	--	--	--	--
Morrow	16,150	10,380	26,530	--	11,782	--	--	--	--	38,312
Sherman	--	--	--	--	--	--	--	--	--	--
Umatilla	6,082	15,119	21,201	450	41,422	--	--	--	--	63,073
Union	12,460	15,718	28,178	101	111,435	377	--	250	--	140,341
Wallowa	8,734	8,570	17,304	171	72,337	--	--	4,121	--	93,933
Wasco	3,925	8,589	12,514	--	83,245	66,432	--	--	--	162,191
Wheeler	13,593	2,836	16,429	--	29,615	--	--	--	--	46,044
Total	590,709	113,806	704,515	33,961	1,319,580	80,478	--	9,923	235	2,148,692
Total Oregon	3,382,615	536,209	3,918,824	1,419,319	3,943,569	80,478	2,900	245,616	18,928	9,629,634

1/ Includes volume removed as logs and poles and piling, but not volume removed for woodcutting operations.
2/ Compiled by State Forester.
3/ Compiled by U.S. Bureau of Land Management.
4/ Compiled by U.S. Forest Service, Region 6.
5/ Compiled by U.S. Bureau of Indian Affairs.

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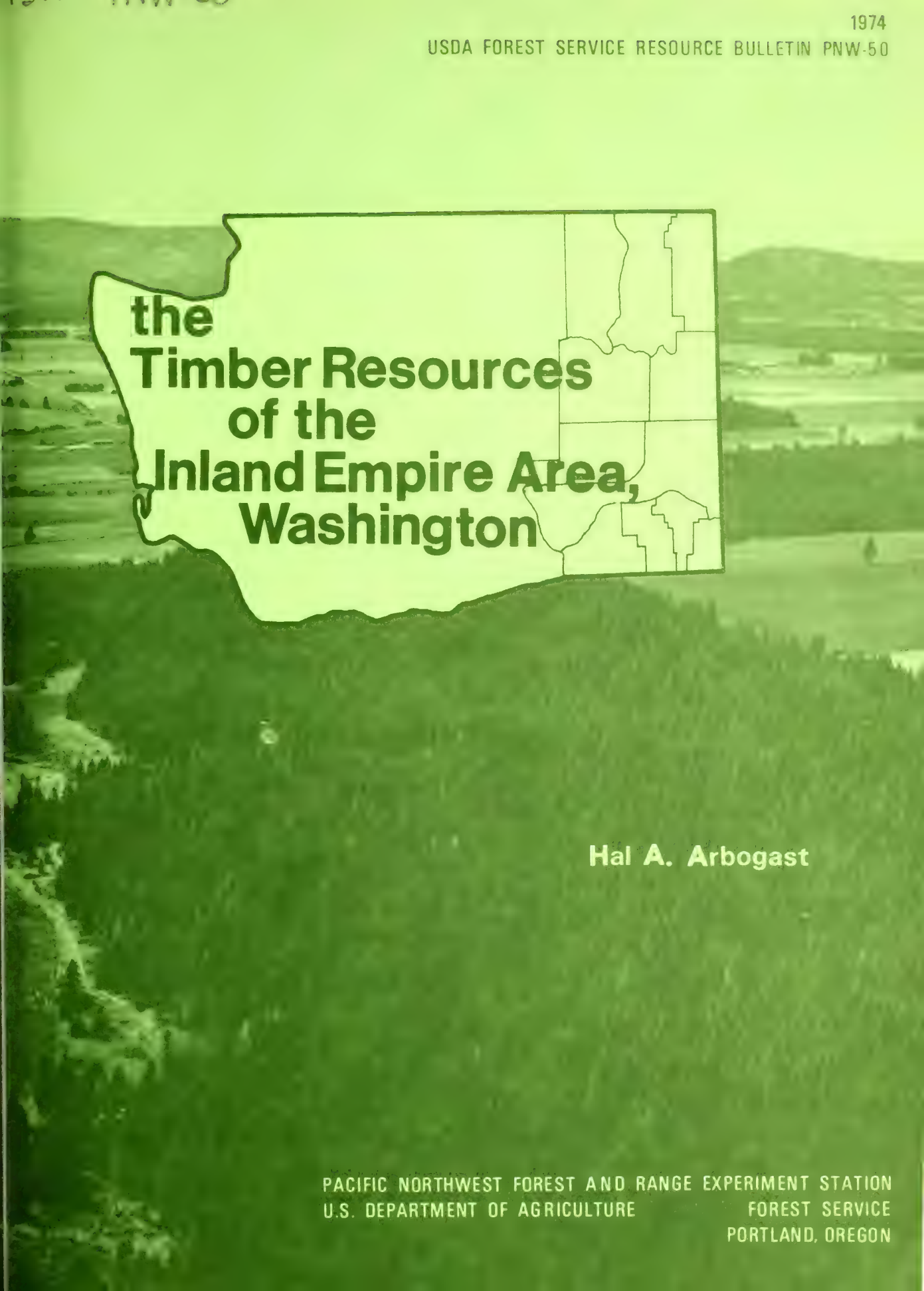

the Timber Resources of the Inland Empire Area, Washington

Hal A. Arbogast

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE
PORTLAND, OREGON

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PREFACE

This publication summarizes the findings of the latest inventory of the timber resources of the 12 easternmost counties of Washington—Pend Oreille, Spokane, Stevens, Ferry, Lincoln, Whitman, Asotin, Garfield, Columbia, Walla Walla, Adams, and Franklin.

Fieldwork on lands outside the National Forests was done in 1968. Forest inventories of the Colville and Kaniksu National Forests in northeast Washington were done in 1964 and 1969, respectively. The Umatilla National Forest in southeastern Washington was inventoried in 1969.

Three previous inventories have been made for Pend Oreille, Spokane, Stevens, Ferry, Lincoln, and Whitman Counties in northeastern Washington during the periods 1934-35, 1946-48, and 1957-61. Two previous timber inventories have been made in Walla Walla, Columbia, Garfield, and Asotin Counties in southeastern Washington — in 1935 and in 1957. Adams and Franklin Counties are included in the Inland Empire area but are not forested.

This report was prepared by the Forest Survey, a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928 and subsequent amendments. The purposes of the Forest Survey are (1) to obtain comprehensive information on timber resources, including the extent and condition of forest lands, the amount and kind of timber growing on these lands, the rate of forest growth and depletion, the amount of timber cut, and probable future trends in timber requirements; and (2) to analyze and make available timber resource information needed to formulate forest policies and programs. Resurveys are made periodically to update basic information.

The Forest Survey is conducted in all the 50 States by the USDA Forest Service Experiment Stations. The Pacific Northwest Forest and Range Experiment Station at Portland, Oregon, is responsible for collecting timber resource information for Alaska, California, Hawaii, Oregon, and Washington.

Forest resource data in this report and the discussion of forest area, volume, growth, and cut relate to the supply of wood available to meet regional and national needs. An analysis is made of the present timber resource, with emphasis on conditions that affect present and future timber production. Following the textual analysis is a more detailed set of tables that give forest area, volume, growth, and mortality statistics. The information in this report is presented for the use of legislators, service organizations, local and regional planners, investors, forest managers, and others interested in the timber situation in eastern Washington.

ABSTRACT

The latest inventory of the timber resources of the Inland Empire area of Washington indicates there are 24 billion board feet of sawtimber on 3.9 million acres of commercial forest land. Public agencies administer about 56 percent of the area and 70 percent of the sawtimber volume, farmer and miscellaneous private ownerships account for 37 percent of the area but only 22 percent of the sawtimber volume, and industry 8 percent of the total commercial forest area and 8 percent of the volume.

Douglas-fir is the most abundant species, accounting for 30 percent of the sawtimber volume. Ponderosa pine accounts for 29 percent of the volume, with larch and true firs also occurring in significant amounts. The forests of the Inland Empire are young, although the 12 percent of old growth is the principal source of timber for the area's forest industries. For the area as a whole, growth exceeds cut, with most of the growth on lands in farmer and miscellaneous private ownership. This imbalance could result in increased timber harvesting, depending on industry's willingness to process smaller timber from these types of owners and the individual owner's management objectives.

Keywords: Forest surveys [regional], statistics [forest].

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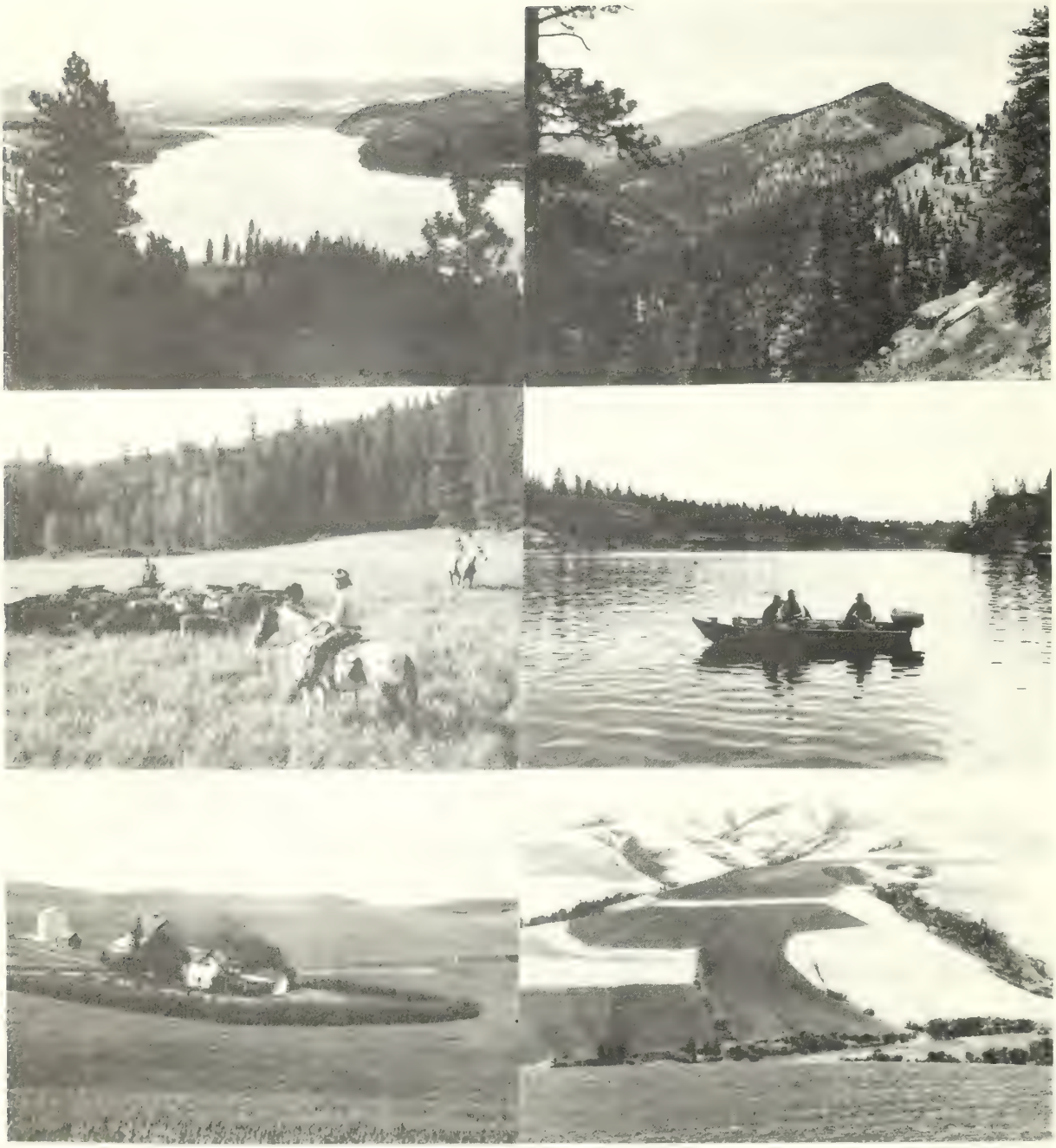

Figure 1. — A land of contrast. Top left — Franklin D. Roosevelt Lake, dividing line between Ferry and Stevens County, Washington. Top right — Looking up Hall Creek with Grizzly Mountain in background, Ferry County, Washington. Middle left — Cattle grazing near Republic in Ferry County, Washington. Middle right — Recreation use on Fish Trap Lake, 15 miles southwest of Cheney, Washington, in Lincoln County. Bottom left — Farm in Palouse wheat country southwest of Palouse, Washington, in Whitman County, Bottom right — View across Mill Creek looking east, 9 miles east of Walla Walla, Washington, in Walla Walla County. Top two photos courtesy of Harold Weaver, retired, BIA. Other photos courtesy of Soil Conservation Service.

FOREST LANDS

The 12.1 million acres that comprise the portion of the Inland Empire in Washington[1] cover a wide diversity of terrain and vegetation (fig. 1). The area reaches north into the rugged and heavily timbered Selkirk, Huckleberry, and Kettle River mountain ranges (fig. 2). Here, the forest lands occur within a wide range of elevation and precipitation—from roughly 1,500 feet with an average annual precipitation of 15 inches up to 7,500 feet where precipitation can average more than 50 inches. The major river drainages of the northern area flow in narrow north-south valleys between the mountain ranges. Most of the central and southern areas are characterized by gently rolling, river-channeled plateaus well-suited for dry farming and including much of the Palouse wheat country. Included in the Inland Empire area are the northernmost reaches of the timbered Blue Mountain range. The forest land in the Blue Mountains reaches 6,500 feet and receives a maximum of 45 inches of precipitation.

The Inland Empire's forest zone encompasses site conditions suitable for a variety of tree species. Douglas-fir, ponderosa pine, and western larch are the principal species.

[1] *The Inland Empire area of Washington [the 12 easternmost counties of the State] is a part of the entire Inland Empire which also includes portions of Canada, Idaho, and Oregon.*

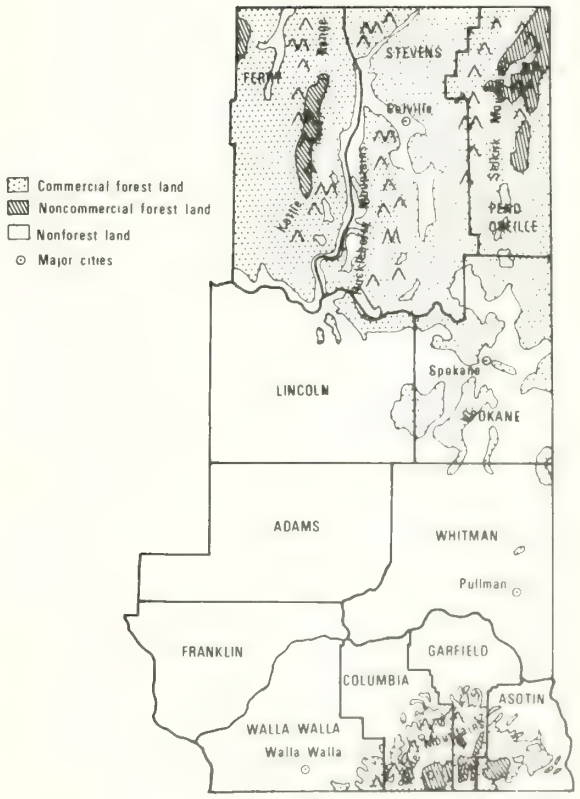

Figure 2.—Commercial, noncommercial, and nonforest lands in eastern Washington, 1968.

Ponderosa pine occurs primarily on the dry sites characteristic of the lower elevations of the forest zone (fig. 3). Douglas-fir and western larch most commonly occur between the ponderosa pine and high-elevational subalpine species. Gradations of association between species occur throughout the forest zone. Other species which occur both in relatively pure stands and in association with other species are grand fir, subalpine fir, Engelmann spruce, lodgepole pine, western white pine, western redcedar, western hemlock, and a small variety of hardwoods.

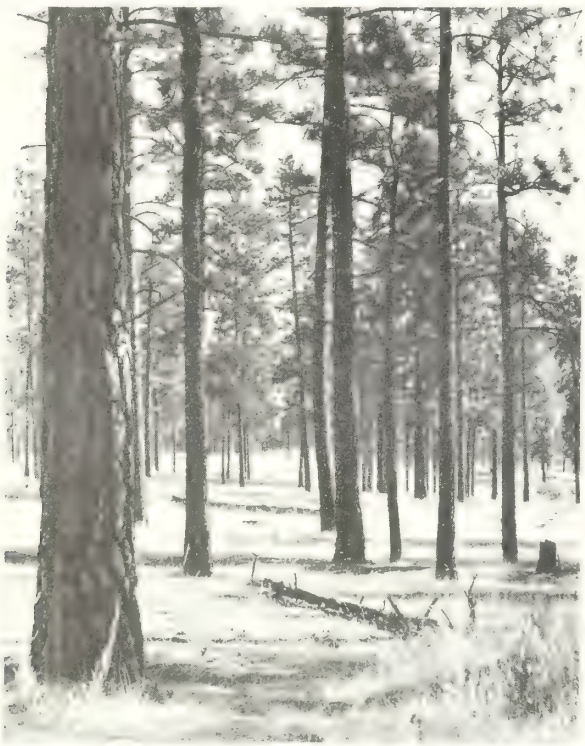

Figure 3.—Ponderosa pine occurs primarily on the dry sites characteristic of the lower elevations of the forest zone. (Photo courtesy of Harold Weaver, retired, BIA.)

The Inland Empire is sparsely populated; only about 454,000 persons, or 13.5 percent of Washington's population, live on 28.4 percent of the area of the State. About 40 percent of the Inland Empire population is in Spokane, Washington's second largest city. Spokane is the major transportation center and hub of economic activity for the Inland Empire.

The Inland Empire was first settled in 1810, with the establishment of "Spokane House." This settlement, which was a bartering center for fur trade with the Indians, was located at the junction of the Spokane and Little Spokane Rivers—about 10 miles northwest of the present site of Spokane. Later, as the fur trade expanded, the center of trading activity moved to Fort Colville on the Columbia River near Kettle Falls.

The influx of fur traders and other venturesome individuals continued through the early 1800's. Their explorations and the reports of their trips created much public interest in the area. Missionary societies sent workers to the area; and their letters describing their experiences started the "Great Migration," as it was called, in 1843 (Waddell 1943).

Discovery of gold hastened the rate of settlement in the Inland Empire during the 1850's and up through the 1890's. Many immigrants, lured by these discoveries, settled down and occupied new land. During the 1880's and 1890's, establishment of mines became particularly significant (fig. 4) when more

Figure 4.—This tungsten mine (old Germania Mine in Stevens County) was established in 1907 and abandoned in 1955. However, the mining industry is still important to the economy of the Inland Empire. (Photo courtesy of Harold Weaver, retired, BIA.)

attention was given to the search for additional minerals, such as lead, silver, copper, zinc, and tin. The mining industry has continued as an important activity.

Forests of the Inland Empire provided the fuel and building material needed for the early settlers. Lumbering first became important to the economy during the 1870's. With the coming of railroads and depletion of white pine in the Lake States, lumbermen in search of new timber established new mills, drawn primarily by the ponderosa and western white pine in the area. Harvesting and processing of wood from much of the area's 4.2 million acres of forest land are important generators of employment and wages in the Inland Empire, accounting for 18 percent of the total manufacturing base in 1971 (State of Washington, 1971). In five counties, Asotin, Ferry, Lincoln, Pend Oreille, and Stevens, forest industries accounted for more than half of the total manufacturing sector. In 1971 for the region as a whole, the forest products industry paid about $19 million in wages to about 2,400 persons.

Timber production is, of course, only one of the values of the forest lands in the Inland Empire. Recreation, water yields, and grazing have been significant uses for many years (fig. 1). Pressures for greater use of these resources will continue to mount and have an increasing effect on timber production. However, presentation of statistics on these "other" uses is beyond the scope of this report, which is limited largely to describing the timber resource.

Forests cover more than one-third of the Inland Empire

The Inland Empire's 4.2 million acres of forests account for 35 percent of the total land area of 12.1 million acres. Of this forest area, 3.9 million acres or 92.9 percent is classed as commercial[2] forest land.

About 56 percent of the commercial forest area is in public ownership. Private owners account for 44 percent. The following tabulation breaks down the kinds of public and private owners.

	Percent
Public:	
National Forests	57
Bureau of Indian Affairs	28
Other public	15
Private:	
Forest industry	17
Farmer	62
Miscellaneous private	21

[2] *"Commercial forest land area" and other terms used in this report are defined in "Definition of Terms."*

About nine-tenths of the commercial forest land on National Forests occurs on the Colville and Kaniksu National Forests in the three northern counties. The northern portion of the Umatilla National Forest in southeastern Washington accounts for the remaining tenth (fig. 5). The three Indian reservations in the Inland Empire—Colville, Spokane, and Kalispell—represent about two-thirds of the "other public" lands. The remainder is State, county, municipal, and other Federal lands.

Most of the forest land in private ownership is owned by farmers. This area, which represents about 62 percent of the total private commercial forest land, occurs in every forested county, but over three-fourths of it is in Pend Oreille, Spokane, and Stevens Counties. The remaining area in private ownership is owned by individuals or corporations owning sawmills, plywood or veneer mills, or pulp plants, and by a number of miscellaneous owners including both individuals and corporations. Most of the industrially owned forest land, as well as the land in miscellaneous private ownership, occurs in Stevens County, with lesser but still significant acreages in Ferry, Pend Oreille, and Spokane Counties. In total, the farmer and miscellaneous private owners hold 83 percent of the

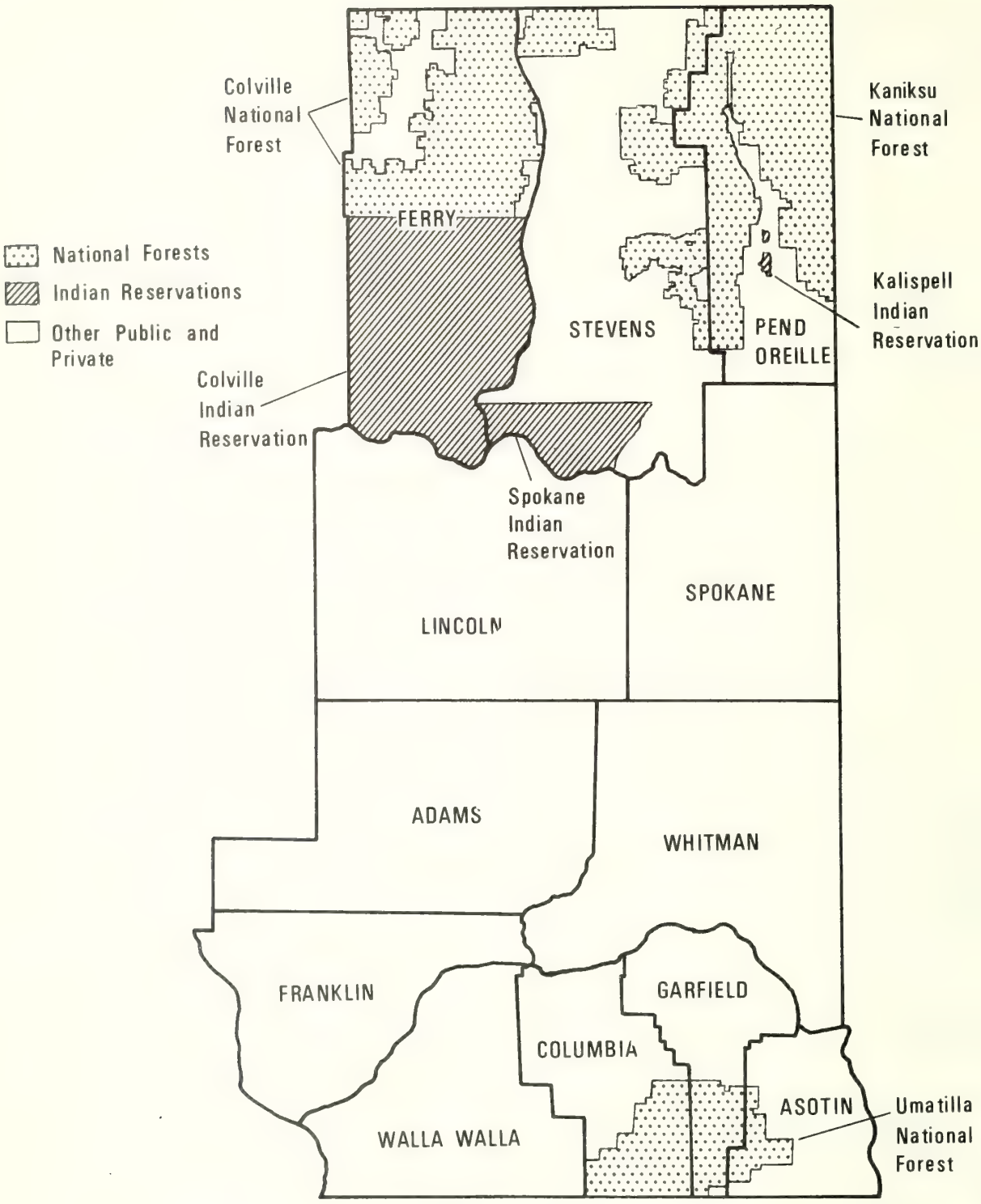

Figure 5.—Ownership map of Washington's Inland Empire.

commercial forest area in private ownership in the Inland Empire, a much greater share than in any other area of comparable size in the State. Consequently, these lands will be a dominant factor in the future supply of timber and other goods and services from private forest lands in this area.

A small area of forested land, 302,000 acres or approximately 2.5 percent of the total land area within the Inland Empire, is classified as noncommercial forest land. Of these lands, 255,000 acres are classified as noncommercial because they are unproductive due to adverse climate and soil conditions. About 80 percent of these unproductive lands consists of thin, rocky soils. The remaining 20 percent is limited in productivity by such factors as lack of precipitation and erosive soils on steep slopes.

The remaining 47,000 acres of noncommercial forest land are physically productive but are reserved from timber production; included are forests in Coulee Dam recreation area, Mount Spokane Park, and a few other State and county parks. Of this area, 4,000 acres on National Forests are classed as deferred, pending study and decisions concerning their classification as productive-reserved or as commercial forest land.

About 58 percent of the noncommercial forest land is in National Forests. "Other public" owners account for 32 percent, leaving only 10 percent on private lands.

Only about 12 percent of commercial forest land is in old-growth sawtimber

The forests of the Inland Empire are mostly young. They consist mainly of young-growth sawtimber, poletimber, saplings, and seedlings. Only 12 percent of the area is in old-growth sawtimber.

	Thousand acres	Percent
Old-growth sawtimber	461	12
Young-growth sawtimber	1,539	39
Poletimber, saplings, and seedlings	1,729	44
Nonstocked	209	5
Total	3,938	100

Although old-growth sawtimber comprises only 12 percent of the commercial forest area (fig. 6), it is of particular significance as a source of wood for present markets. In 1970, the principal old-growth species—ponderosa pine, Douglas-fir, and western larch—made up about three-fourths of the log consumption in the Inland Empire (Bergvall and Holtcamp 1970).

With most (93 percent) of the old-growth forest area in public ownership, the industries are heavily dependent on these ownerships for the type and size of material they are currently utilizing. The 286,000 acres of old growth on National Forests is two-thirds of the total old growth in public ownership.

The large area of young and intermediate age stands in the "farmer and miscellaneous private" category—1.3 million acres or nearly two-fifths of all such stands—undoubtedly will be far more important to the timber industry than they are today.

	Young-growth sawtimber	Poletimber and saplings-seedlings	Total	Percent
		Thousand acres		
National Forest	304	632	936	29
Other public	520	237	757	23
Forest industry	141	140	281	9
Farmer-miscellaneous private	574	720	1,294	39
Total	1,539	1,729	3,268	100

Despite the oncoming young-growth stands in farmer and miscellaneous private forest land, the National Forests contain the greatest potential for sustaining high levels of timber production over time. Forty-three percent of the National Forests are in site classes potentially capable of yielding more than 120 cubic feet per acre per year compared with 5 to 7 percent in other ownerships. Between 70 and 80 percent of the total commercial forest land in other public, forest industry, and farmer and miscellaneous private holdings have yield potentials of less than 84 cubic feet per acre per year, reflecting drier sites and more adverse growing conditions characteristic of lower elevations.

Figure 6. — Old-growth sawtimber stands occupy 461,000 acres in the Inland Empire area. A, a virgin stand of ponderosa pine, Douglas-fir, and western larch. Not all old growth is in large trees — some, like the 200-year-old, even-aged stand of ponderosa pine, B, is in relatively small trees. (Photos courtesy of Harold Weaver, retired, BIA.)

Five percent of the commercial area is nonstocked

About 209,000 acres or 5 percent of the commercial timberlands in the Inland Empire of Washington have either no trees or too few to qualify as stocked. Of these lands, 69 percent are in farmer and miscellaneous private holdings and comprise 10 percent of this ownership.

About 80 percent of the nonstocked area occurs in the ponderosa pine type of three northeastern Washington counties—Ferry, Spokane, and Stevens. The ponderosa pine type occurs primarily on the dry sites characteristic of the lower elevations of the forest zone. A recent study (MacLean and Bolsinger 1973) in eastern Oregon and California indicates that many of these nonstocked and poorly stocked areas do not have the capability of supporting more trees. It is probable that some of the areas classified as nonstocked in the Inland Empire do not have the potential for supporting commercial stands of timber and in the future will be considered noncommercial.

Douglas-fir and ponderosa pine are the most extensive forest types

The Inland Empire is characterized by a diversity of commercially important timber types. Douglas-fir and ponderosa pine types, which are so widespread in the Western States, are the leading types in the Inland Empire of Washington; and western larch type ranks third in terms of area (fig. 7).

Other widely distributed western types that occur here are lodgepole pine, grand fir, western redcedar, Engelmann spruce, and subalpine fir. Two other types of more limited distribution but commercially significant within the Inland Empire are western hemlock and western white pine. A small amount of hardwoods also occurs as a type.

Sawtimber volume represents about 8 percent of State total

Although the 3.9 million acres of commercial forest land in the Inland Empire of Washington comprises 21 percent of the State's total commercial forest land area, the 23.9 billion board feet[3] in sawtimber trees represents only 7 percent of the total sawtimber volume. Volume in growing stock trees in the Inland Empire of Washington amounts to 6.5 million cubic feet. Softwoods greatly predominate; less than 2 percent of the commercial forest area, as well as sawtimber and growing stock volumes, falls in the hardwood category. There is little volume—only 3 percent—in salvable dead and cull trees.

The commercial forest area of the Inland Empire averages 6,059 board feet per acre. This is considerably less than the volume found in those parts of the State with better site conditions. In western Washington, where amount of precipitation, length of growing season, and other factors of growth are more favorable, the average volume per acre is 26,370 board feet; in central Washington it is 11,650.

[3] *All board-foot volumes in this report, except where noted, are International ¼-inch rule.*

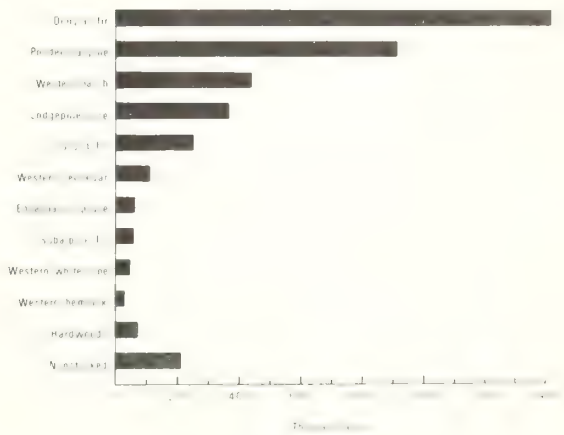

Figure 7.—Acreage of forest types in eastern Washington.

Sawtimber volume is concentrated on public lands

Although public lands represent about 56 percent of the commercial forest area, they contain 70 percent of the board-foot volume. The distribution of area and sawtimber volume as well as average volume per acre among major ownership classes are shown in table 1.

Nearly three-fourths of sawtimber volume is of three species — Douglas-fir, ponderosa pine, and western larch. For these three species combined, public lands account for about two-thirds of the sawtimber volume. Douglas-fir and western larch occur more commonly at intermediate to higher elevations where public lands predominate. Western larch is particularly prevalent in public ownership. Although 57 percent of the ponderosa pine type area is privately owned, it has been so greatly cut that public lands also have the larger part of the ponderosa pine volume.

	Douglas-fir	Ponderosa pine	Western larch
	Million board feet		
Public	4,790	3,923	3,064
Private	2,283	2,884	765
Total	7,073	6,807	3,829

There are a number of other species which individually account for small percentages of the total sawtimber volume but collectively comprise about one-fourth of the total. These other softwood species in order of amount of sawtimber volume are grand fir, lodgepole pine, subalpine fir, western white pine, Engelmann spruce, western redcedar, and western hemlock. As shown by the following breakdown of volume of these relatively minor species, public ownership greatly predominates:

Minor Species	
	Million board feet
Public	4,680
Private	1,163
Total	5,843

These minor species will very likely become more important as the old-growth volume of the leading species diminishes.

Table 1. — Area, Sawtimber volume, and volume per acre of commercial forest, by ownership class, Inland Empire area, Washington, 1968
(International 1/4-inch rule)

Ownership class	Area		Sawtimber volume		Volume per acre
	Thousand acres	*Percent*	*Million board feet*	*Percent*	*Board feet*
National Forest	1,240	31.5	9,678	40.5	7,805
Other public	947	24.0	7,008	29.4	7,400
Forest industry	302	7.7	1,928	8.1	6,384
Farmer and miscellaneous private	1,449	36.8	5,246	22.0	3,620
Total	3,938	100.0	23,860	100.0	6,059

GROWTH, CUT, AND MORTALITY

Net annual sawtimber growth is 567 million board feet

Net growth of sawtimber on commercial forest land in Washington's Inland Empire is estimated at 567 million board feet for 1968 — about 2.1 percent of inventory volume for that year. Net growth per acre averaged 144 board feet for all ownerships, with growth on public lands 121 board feet per acre and private lands 174 board feet. Table 2 shows inventory, growth, and mortality for the four ownership groups.

The low net annual growth rates on National Forest land reflect both the lower growth and high mortality that accompany old-growth sawtimber stands as well as the large area in pole and seedling-sapling stands on which board-foot increment is not yet accruing. Taken together, these lands with low board-foot growth account for about three-quarters of the commercial forest area on National Forests; only one-quarter is in relatively fast growing young sawtimber.

Net annual growth per acre is highest on private lands. On both industrial-owned lands and farmer and miscellaneous private holdings, mortality is far less than on public lands and 40 to 50 percent of their commercial forest land area is in young-growth sawtimber stands.

Net growth is higher on other public lands than on National Forest Lands, despite a high mortality, perhaps reflecting the fact that almost 55 percent of these lands are in young-growth sawtimer stands.

Table 2. — Annual per-acre volume, growth, and mortality, by ownership class, Inland Empire area, Washington, 1968
(International 1/4-inch rule)

Ownership class	Inventory volume per acre	Gross growth per acre	Net annual growth per acre	Annual mortality per acre	Annual mortality as % of gross growth
	Board feet				*Percent*
National Forest	7,805	192	117	75	53
Other public	7,400	214	125	89	42
Forest industry	6,384	221	199	22	10
Farmer and miscellaneous private	3,620	183	168	15	8
Average, all ownerships	6,059	196	144	52	29

Net annual growth exceeds cut

Growth in Washington's Inland Empire exceeds cut. Annual net growth in 1968 was 567 million board feet; annual cut of live trees for the period 1968-71 averaged about 415 million board feet.

Comparisons of growth and cut are meaningful only when management objectives, development toward meeting these objectives, and social and economic factors are considered. The following tabulation shows growth, average annual cut from 1968 to 1971, and net effect on inventory by ownership class.

The two public ownerships are in the process of converting a largely old-growth forest to a managed young-growth forest. The long-term goal is a regulated forest with a relatively even distribution of stand age classes to provide continuous timber production. Though cut is slightly more than growth at the present time, growth will increase in the future as the more slowly growing old-growth stands are harvested and replaced with rapidly growing young-growth stands.

Cut and growth on industrial ownerships are about in balance; if present trends continue, the inventory should remain relatively constant over time. Most of the land in industrial ownership is adequately stocked, and little slow-growing old growth remains in this ownership. Thus, the present level of cut should be generally sustainable over an extended period of time.

Substantially more timber is growing annually on the farmer and miscellaneous private lands than is being harvested—244 million board feet versus 79 million. Several factors contribute to this. Farmer and miscellaneous private ownerships have lower volumes per acre and smaller trees and thus higher conversion costs (fig. 8). Only 30 percent of the area in farmer and miscellaneous private ownership has stands of timber of more than 5,000 board feet per acre, compared with 51 percent for industry lands and 76 percent for public lands.

Figure 8.—The small average size of sawtimber on this old farmstead in Ferry County may partially account for limited cutting on these lands. (Photo courtesy of Harold Weaver, retired, BIA.)

Ownership	Inventory volume	Live cut	Net annual growth	Annual change in inventory
	Thousand board feet, International ¼-inch rule			*Percent*
National Forest	9,678,000	152,085	144,500	—0.08
Other public	7,008,000	129,362	118,200	—.16
Forest industry	1,928,000	55,096	60,200	+.26
Farmer and misc. private	5,246,000	78,622	244,000	+3.15
All ownerships	23,860,000	415,165	566,900	+.64

A second and possibly more important factor was the rise in timber availability from public lands during the 1960's (fig. 9) because of increased annual cuts. The relatively larger trees and volumes per acre on public lands became more attractive to industry buyers than the smaller trees and low volumes per acre on farmer and miscellaneous private lands.

The farmer and miscellaneous private owners represent a diverse group with various objectives ranging from timber production to esthetic and recreational benefits. To the extent that timber growing is the objective of a significant portion of these owners, the excess of growth over cut should result in increased harvesting on these lands as the stands increase in volume and sizes of trees more attractive to industry. This owner group can be expected to soon dominate the private timber supply picture in Washington's Inland Empire.

Mortality greatest on public lands

Approximately 53 million cubic feet of timber, which includes about 205 million board feet of sawtimber, was estimated to have died annually over the period 1959-68. Over 85 percent of total sawtimber mortality and the heaviest rates occurred on the public ownerships (tables 2 and 31). On private lands with their limited old-growth inventory, mortality was only 8 to 10 percent of gross growth as contrasted with the 42 to 53 percent on public lands.

Data which identify the cause of mortality show that weather and insects are the major causes of mortality. This is based on 31 million cubic feet (112 million board feet) on lands other than National Forests.[4] Weather damage was mostly in the form of wind and snow

[4] Cause-of-mortality data are not available for the Colville and Kaniksu National Forests.

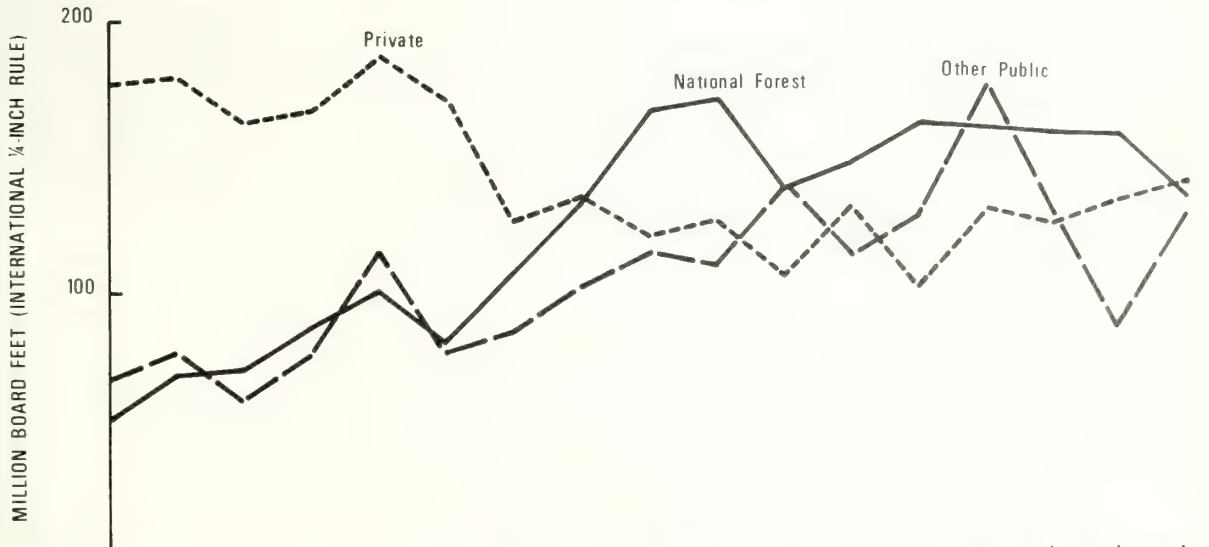

Figure 9.—Live and dead timber cut by ownership class, Inland Empire area, Washington, 1955-71 (International ¼-inch rule).

breakage, and the most common insect was the western larch casebearer and various bark beetles (USDA Forest Service 1958-68). Wind and insects accounted for slightly more than half the damage. Other damaging agents include fire, disease, animals, suppression, logging, and unknown causes.

Because mortality normally occurs in isolated trees or small stands, salvage of this material is limited. The salvable dead material that was removed by logging over the last decade averaged about 4.5 million board feet annually. This amounts to slightly over 2 percent of the estimated annual mortality.

TIMBER INDUSTRY

The forest resource of the Inland Empire provides raw material for a very substantial timber industry (fig. 10). The timber industry is a leading source of employment and the principal manufacturing industry in this part of the State.

Timber harvesting has been increasing recently. Between 1955 and 1970, the harvest of logs increased from 301 million board feet to 381 million—a rise of 27 percent (fig. 9). The log harvest is consumed mainly by mills within the Washington Inland Empire area, although some logs go to mills elsewhere in Washington, as well as to neighboring States.

A 1970 survey of Washington mills included many detailed statistics on primary wood processing plants in the Inland Empire. All statistics in this section are from this survey (Bergvall and Holtcamp 1971).

In 1970, the Inland Empire had 42 mills—8 percent of the 509 mills reported for the State. These mills were distributed by county and industry as shown in table 3.

Figure 10. — One of the three plywood mills in Washington's Inland Empire that make for a diversified timber industry. This mill is located in Stevens County near Kettle Falls, Washington. (Photo courtesy of Boise Cascade Corp., Boise, Idaho.)

Table 3. — Number of mills in the timber industry, by industry and county, Inland Empire area, Washington, 1970

County	Industry					
	Total	Lumber	Veneer and plywood	Pulp	Shake and shingle	Pole, post, and piling
Asotin	1	1	0	0	0	0
Ferry	6	6	0	0	0	0
Pend Oreille	4	3	0	0	0	1
Spokane	8	4	1	2	0	1
Stevens	19	14	2	0	1	2
Walla Walla	4	2	0	2	0	0
Total	42	30	3	4	1	4

The lumber industry with 30 sawmills was the principal component of the timber industry. These mills had a combined capacity of about 1 million board feet per 8-hour shift, equivalent to 9 percent of total capacity of sawmills in the State. The 257 million board feet of log receipts by sawmills in 1970 amounted to a little more than three-quarters of the log receipts by all timber industry mills in Washington's Inland Empire. Fifty-six percent of logs received by sawmills were reported as harvested from public lands.

The 42 mills of all types received 334 million board feet of logs in 1970. Eighty-nine percent of this volume came from log harvests within the Inland Empire, 3 percent from elsewhere in Washington, and 8 percent from out-of-State.

Table 4. — Area by land class and county, Inland Empire area, Washington, January 1, 1969
(In thousand acres)

Land class	All counties	Adams	Asotin	Columbia	Ferry	Franklin	Garfield	Lincoln	Pend Oreille	Spokane	Stevens	Walla Walla	Whitman
Forest													
Commercial	3,938	—	54	125	1,113	—	63	77	778	407	1,298	13	10
Productive-reserved[1]	47	—	—	1	4	—	—	2	7	28	5	—	—
Unproductive	255	—	10	46	114	—	25	1	20	2	35	2	—
Total forest	4,240	—	64	172	1,231	—	88	80	805	437	1,338	15	10
Nonforest[2]	7,882	1,213	341	379	178	806	368	1,395	92	688	250	796	1,376
Total area[3]	12,122	1,213	405	551	1,409	806	456	1,475	897	1,125	1,588	811	1,386

[1] *Includes 4,000 acres of deferred land on National Forests set aside for study as to land use allocation.*

[2] *Includes swampland and industrial and urban areas, other nonforest land, and 1,210 acres, classed as water by Forest Survey standards but defined by the Bureau of the Census as land.*

[3] *Source: U.S. Bureau of the Census, Land and Water Area of the United States, 1960, revised 1965.*

Table 5. — Area of commercial forest land by ownership class and county, Inland Empire area, Washington, January 1, 1969
(In thousand acres)

Ownership class	All counties	Asotin	Columbia	Ferry	Garfield	Lincoln	Pend Oreille	Spokane	Stevens	Walla Walla	Whitman
National Forest	1,240	24	71	409	50	—	460	—	226	—	—
Other public:[1]											
Bureau of Land Management	26	([2])	—	10	—	—	1	—	15	—	—
Bureau of Indian Affairs	611	—	—	487	—	—	3	—	121	—	—
Miscellaneous Federal	73	—	—	—	—	—	—	10	63	—	—
State	233	2	5	31	2	7	34	10	140	1	1
County and municipal	4	—	—	1	—	—	3	—	—	([2])	—
Total other public	947	2	5	529	2	7	41	20	339	1	1
Private:											
Forest industry	302	—	4	46	1	—	41	24	186	—	—
Farmer-owned	1,075	21	45	92	10	64	144	314	370	6	9
Miscellaneous private—corporate	198	7	—	11	—	—	86	16	72	6	—
Miscellaneous private—noncorporate	176	—	—	26	—	6	6	33	105	—	—
Total private	1,751	28	49	175	11	70	277	387	733	12	9
All classes	3,938	54	125	1,113	63	77	778	407	1,298	13	10

[1] *Estimates of commercial forest land in specific ownerships are derived by sampling methods. Consequently, they may not agree with the official estimates of the individual agencies.*

[2] *Less than 500 acres.*

Table 6. — Area of commercial forest land by stand-size and ownership classes, Inland Empire area, Washington, January 1, 1969
(In thousand acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Sawtimber stands:					
Old growth[1]	461	286	143	21	11
Young growth[2]	1,539	304	520	141	574
Total	2,000	590	663	162	585
Poletimber stands	929	255	128	72	474
Sapling and seedling stands	800	377	109	68	246
Nonstocked areas	209	18	47	—	144
All classes	3,938	1,240	947	302	1,449

[1]*Stands 140 years and older.*

[2]*Stands less than 140 years old.*

Table 7. — Area of commercial forest land by stand volume and ownership class, Inland Empire area, Washington, January 1, 1969
(In thousand acres)

Stand volume[1]	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Less than 1,500	659	47	111	35	466
1,500-4,999	1,026	129	232	113	552
5,000-9,999	1,121	298	351	112	360
10,000-19,999	1,067	713	247	38	69
20,000-29,999	51	44	1	4	2
30,000 or more	14	9	5	—	—
All classes	3,938	1,240	947	302	1,449

[1] *Net volume, board feet per acre, International ¼-inch rule.*

Table 8. — Area of commercial forest land by cubic-foot site and ownership classes, Inland Empire area, Washington, January 1, 1969
(In thousand acres)

Site class[1] (cubic feet)	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
225 or more	—	—	—	—	—
165-224	189	141	10	([2])	38
120-164	509	386	38	16	69
85-119	894	396	159	66	273
50-84	2,023	227	651	205	940
20-49	323	90	89	15	129
All classes	3,938	1,240	947	302	1,449

[1] *A classification in terms of capacity for cubic-foot annual growth per acre at culmination of mean annual growth in full-stocked stands.*

[2] *Less than 500 acres.*

Table 9. — Area of commercial forest land by forest type and ownership class, Inland Empire area, Washington, January 1, 1969
(In thousand acres)

Forest type	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Douglas-fir	1,405	388	383	131	503
Grand fir	247	142	39	([1])	66
Subalpine fir	57	44	—	7	6
Western larch	435	274	51	28	82
Ponderosa pine	909	80	314	69	446
Lodgepole pine	364	145	82	6	131
Western white pine	45	39	—	—	6
Engelmann spruce	62	56	—	—	6
Western redcedar	109	22	10	61	16
Western hemlock	26	26	—	—	—
Hardwoods[2]	70	6	21	—	43
Nonstocked	209	18	47	—	144
All types	3,938	1,240	947	302	1,449

[1] *Less than 500 acres.*

[2] *Includes primarily red alder, white alder, paper birch, quaking aspen, and black cottonwood.*

Table 10. — Area of noncommercial forest land by ground land use and ownership class, Inland Empire area, Washington, January 1, 1969
(In thousand acres)

Forest type	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Productive:[1]					
Douglas-fir	2	2	([2])	—	—
Spruce-fir	10	—	10	—	—
Western larch	([2])	—	([2])	—	—
Ponderosa pine	28	—	28	—	—
Lodgepole pine	1	—	1	—	—
Western white pine	2	—	2	—	—
Unclassified[3]	4	4	—	—	—
Total productive	47	6	41	—	—
Unproductive:					
Low site[4]	35	7	21	—	7
Noncommercial rocky[5]	203	145	34	1	23
Other[6]	17	17	—	—	—
Total unproductive	255	169	55	1	30
Total	302	175	96	1	30

[1] *Includes land capable of growing 20 cubic feet or more per acre per year but set aside in a reserved category, such as county and State parks.*

[2] *Less than 500 acres.*

[3] *Deferred lands on National Forests set aside for study as to land use allocation.*

[4] *Areas stocked with commercial tree species but incapable of growing 20 cubic feet per acre per year because of soil and climatic factors.*

[5] *Includes areas that are capable of growing 20 cubic feet or more per year in merchantable trees but are too steep and rocky for timber management.*

[6] *Includes unstable areas that cannot be logged without seriously affecting the watershed and small isolated patches of commercial forest on steep mountainsides.*

Table 11. — Volume of growing stock and sawtimber on commercial forest land, by ownership class and by softwoods and hardwoods, Inland Empire area, Washington, January 1, 1969

Ownership class	Volume per acre	Total volume		
		All species	Softwoods	Hardwoods
	Cubic feet	.....	*Million cubic feet*	.....
Growing stock:				
National Forest	1,919	2,380	2,357	23
Other public	1,781	1,687	1,637	50
Forest industry	1,834	554	539	15
Farmer and miscellaneous private	1,317	1,908	1,877	31
All ownerships	1,658	6,529	6,410	119
	Board feet	.....	*Million board feet*	.....
Sawtimber (International ¼-inch rule):				
National Forest	7,805	9,678	9,637	41
Other public	7,400	7,008	6,820	188
Forest industry	6,384	1,928	1,892	36
Farmer and miscellaneous private	3,620	5,246	5,203	43
All ownerships	6,059	23,860	23,552	308
Sawtimber (Scribner rule):				
National Forest	6,675	8,277	8,241	36
Other public	6,312	5,977	5,792	185
Forest industry	5,374	1,623	1,588	35
Farmer and miscellaneous private	2,930	4,245	4,204	41
All ownerships	5,110	20,122	19,825	297

Table 12. — Volume of growing stock and sawtimber on commercial forest land, by county and ownership class, Inland Empire area, Washington, January 1, 1969

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
			Million cubic feet		
Growing stock:					
Asotin	121	75	7	—	39
Columbia	389	296	8	11	74
Ferry	1,710	630	885	74	121
Garfield	179	156	1	2	20
Lincoln	80	—	7	—	73
Pend Oreille	1,465	855	85	112	413
Spokane	540	—	31	51	458
Stevens	2,022	368	660	304	690
Walla Walla	11	—	2	—	9
Whitman	12	—	1	—	11
Total	6,529	2,380	1,687	554	1,908
			Million board feet		
Sawtimber (International ¼-inch rule):					
Asotin	465	301	35	—	129
Columbia	1,855	1,455	26	56	318
Ferry	7,390	2,607	4,164	317	302
Garfield	808	750	5	4	49
Lincoln	257	—	29	—	228
Pend Oreille	4,741	3,187	259	427	868
Spokane	1,689	—	100	187	1,402
Stevens	6,550	1,378	2,372	937	1,863
Walla Walla	42	—	10	—	32
Whitman	63	—	8	—	55
Total	23,860	9,678	7,008	1,928	5,246
Sawtimber (Scribner rule):					
Asotin	384	251	31	—	102
Columbia	1,554	1,222	19	48	265
Ferry	6,387	2,260	3,608	275	244
Garfield	676	628	4	3	41
Lincoln	214	—	25	—	189
Pend Oreille	3,976	2,725	209	354	688
Spokane	1,389	—	83	160	1,146
Stevens	5,454	1,191	1,983	783	1,497
Walla Walla	35	—	8	—	27
Whitman	53	—	7	—	46
Total	20,122	8,277	5,977	1,623	4,245

Table 13. — Number of growing-stock trees on commercial forest land, by diameter and ownership classes, Inland Empire area, Washington, January 1, 1969
(Thousands of trees)

Diameter class (inches at breast height)	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
5.0-6.9	198,955	67,612	35,821	17,513	78,009
7.0-8.9	118,757	41,279	22,044	8,737	46,697
9.0-10.9	67,403	21,825	13,568	6,482	25,528
11.0-12.9	39,379	12,863	8,585	3,724	14,207
13.0-14.9	24,297	7,552	6,555	1,915	8,275
15.0-16.9	13,937	5,242	3,705	900	4,090
17.0-18.9	9,759	3,443	3,051	768	2,497
19.0-20.9	5,643	2,068	1,677	579	1,319
21.0-28.9	9,096	3,440	3,537	760	1,359
29.0-38.9	1,501	746	530	144	81
39.0 and larger	146	110	8	24	4
All classes	488,873	166,180	99,081	41,546	182,066

Table 14. — Number of growing-stock trees on commercial forest land, by species and diameter class, Inland Empire area, Washington, January 1, 1969
(In thousand trees)

Species	Diameter class (inches at breast height)											
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0-38.9	39.0 and larger
Softwoods:												
Douglas-fir	149,502	57,860	33,368	24,106	13,132	8,239	4,498	3,070	1,918	2,924	337	50
Grand fir	31,815	11,207	8,307	4,899	2,889	1,582	1,053	687	435	633	119	4
Subalpine fir	26,985	11,978	6,388	4,032	1,793	1,100	694	469	202	302	26	1
Western larch	71,467	29,782	17,338	8,361	6,362	3,683	2,262	1,491	637	1,288	243	20
Ponderosa pine	81,466	27,212	18,520	10,560	7,396	5,918	3,530	2,856	1,818	3,021	599	36
Lodgepole pine	77,722	40,944	22,361	8,529	3,453	1,529	604	190	97	15	—	—
Western white pine	7,317	1,592	1,667	1,624	1,130	511	345	175	99	143	30	1
Engelmann spruce	9,628	4,507	1,794	914	870	542	354	272	126	205	40	4
Western redcedar	14,571	5,465	3,851	2,059	1,292	744	384	297	150	220	81	28
Western hemlock	6,100	2,114	1,733	995	412	287	173	146	66	147	25	2
Total	476,573	192,661	115,327	66,079	38,729	24,135	13,897	9,653	5,548	8,898	1,500	146
Hardwoods[1]	12,300	6,294	3,430	1,324	650	162	40	106	95	198	1	—
All species	488,873	198,955	118,757	67,403	39,379	24,297	13,937	9,759	5,643	9,096	1,501	146

[1] *Includes primarily red alder, white alder, paper birch, quaking aspen, and black cottonwood.*

Table 15. — Volume of timber on commercial forest land, by class of timber and by softwoods and hardwoods, Inland Empire area, Washington, January 1, 1969
(In million cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Growing stock			
Sawtimber trees:			
Saw-log portion	4,301	4,245	56
Upper-stem portion	133	131	2
Total	4,434	4,376	58
Poletimber trees	2,095	2,034	61
All growing stock	6,529	6,410	119
Nongrowing stock			
Sound cull trees	45	43	2
Rotten cull trees	40	40	([1])
Salvable dead sawtimber trees	109	109	—
Total, all timber	6,723	6,602	121

[1] *Less than 500,000 cubic feet.*

Table 16. — Volume of growing stock and sawtimber on commercial forest land, by stand-size class and by softwoods and hardwoods, Inland Empire area, Washington, January 1, 1969

Stand-size class	Volume per acre	Total volume		
		All species	Softwoods	Hardwoods
	Cubic Feet	*Million cubic feet*		
Growing stock:				
Sawtimber stands	2,202	4,403	4,337	66
Poletimber stands	1,733	1,610	1,568	42
Sapling and seedling stands	584	467	456	11
Nonstocked areas	234	49	49	—
All classes	1,658	6,529	6,410	119
	Board feet	*Million board feet*		
Sawtimber (International ¼-inch rule):				
Sawtimber stands	9,750	19,499	19,254	245
Poletimber stands	2,888	2,683	2,641	42
Sapling and seedling stands	1,826	1,461	1,440	21
Nonstocked areas	1,038	217	217	—
All classes	6,059	23,860	23,552	308
Sawtimber (Scribner rule):				
Sawtimber stands	8,254	16,508	16,265	243
Poletimber stands	2,357	2,190	2,156	34
Sapling and seedling stands	1,545	1,236	1,216	20
Nonstocked areas	900	188	188	—
All classes	5,110	20,122	19,825	297

Table 17. — Volume of growing stock on commercial forest land, by species and county, Inland Empire area, Washington, January 1, 1969
(In million cubic feet)

Species	All counties	Asotin	Columbia	Ferry	Garfield	Lincoln	Pend Oreille	Spokane	Stevens	Walla Walla	Whitman
Softwoods:											
Douglas-fir	1,995	19	116	613	33	19	355	132	703	3	2
Grand fir	507	22	115	56	66	—	96	51	97	4	—
Subalpine fir	269	3	32	68	4	—	121	3	38	—	—
Western larch	990	20	29	314	12	—	241	26	348	—	—
Ponderosa pine	1,466	40	58	438	39	61	92	253	471	4	10
Lodgepole pine	627	8	14	124	12	—	236	57	176	—	—
Western white pine	146	—	—	39	—	—	81	1	25	—	—
Engelmann spruce	141	9	23	30	13	—	48	—	18	—	—
Western redcedar	175	—	—	12	—	—	98	7	58	—	—
Western hemlock	94	—	—	5	—	—	75	4	10	—	—
Total	6,410	121	387	1,699	179	80	1,443	534	1,944	11	12
Hardwoods[1]	119	—	2	11	—	—	22	6	78	—	—
All species	6,529	121	389	1,710	179	80	1,465	540	2,022	11	12

[1] *Includes primarily red alder, white alder, paper birch, quaking aspen, and black cottonwood.*

Table 18. — Volume of sawtimber on commercial forest land, by species and county, Inland Empire area, Washington, January 1, 1969 (International ¼-inch rule)

(In million board feet)

Species	All Counties	Asotin	Columbia	Ferry	Garfield	Lincoln	Pend Oreille	Spokane	Stevens	Walla Walla	Whitman
Softwoods:											
Douglas-fir	7,073	65	557	2,487	141	54	1,205	401	2,141	13	9
Grand fir	1,888	98	523	209	280	—	297	192	280	9	—
Subalpine fir	827	11	105	241	9	—	327	7	127	—	—
Western larch	3,829	51	138	1,448	50	—	911	81	1,149	1	—
Ponderosa pine	6,807	199	381	2,420	247	203	414	921	1,949	19	54
Lodgepole pine	885	1	34	171	20	—	311	53	295	—	—
Western white pine	658	—	—	201	—	—	340	3	114	—	—
Engelmann spruce	638	40	110	142	61	—	214	—	71	—	—
Western redcedar	574	—	—	44	—	—	362	19	149	—	—
Western hemlock	373	—	—	20	—	—	311	12	30	—	—
Total	23,552	465	1,848	7,383	808	257	4,692	1,689	6,305	42	63
Hardwoods[1]	308	—	7	7	—	—	49	—	245	—	—
All species	23,860	465	1,855	7,390	808	257	4,741	1,689	6,550	42	63

[1] *Includes primarily paper birch, quaking aspen, and black cottonwood.*

Table 19. — Volume of growing stock on commercial forest land, by species and ownership class, Inland Empire area, Washington, January 1, 1969
(In million cubic feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Douglas-fir	1,995	562	618	176	639
Grand Fir	507	276	57	54	120
Subalpine fir	269	232	4	9	24
Western larch	990	435	267	83	205
Ponderosa pine	1,466	191	533	119	623
Lodgepole pine	627	261	119	41	206
Western white pine	146	130	3	7	6
Engelmann spruce	141	129	4	6	2
Western redcedar	175	61	30	39	45
Western hemlock	94	80	2	5	7
Total	6,410	2,357	1,637	539	1,877
Hardwoods[1]	119	23	50	15	31
All species	6,529	2,380	1,687	554	1,908

[1] *Includes primarily red alder, white alder, paper birch, quaking aspen, and black cottonwood.*

Table 20. — Volume of sawtimber on commercial forest land, by species and ownership class, Inland Empire area, Washington, January 1, 1969 (International ¼-inch rule)
(In million board feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Douglas-fir	7,073	2,316	2,474	574	1,709
Grand fir	1,888	1,192	180	164	352
Subalpine fir	827	785	—	27	15
Western larch	3,829	1,972	1,092	292	473
Ponderosa pine	6,807	1,151	2,772	588	2,296
Lodgepole pine	885	404	180	115	186
Western white pine	658	613	5	21	19
Engelmann spruce	638	599	19	20	—
Western redcedar	574	262	90	85	137
Western hemlock	373	343	8	6	16
Total	23,552	9,637	6,820	1,892	5,203
Hardwoods[1]	308	41	188	36	43
All species	23,860	9,678	7,008	1,928	5,246

[1] *Includes primarily paper birch, quaking aspen, and black cottonwood.*

Table 21. — Volume of sawtimber on commercial forest land, by species and ownership class, Inland Empire area, Washington, January 1, 1969 [Scribner rule]
(In million board feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Douglas-fir	5,908	1,979	2,104	482	1,343
Grand fir	1,580	996	153	138	293
Subalpine fir	697	664	—	20	13
Western larch	3,165	1,671	893	241	360
Ponderosa pine	5,826	1,001	2,404	512	1,909
Lodgepole pine	745	360	145	93	147
Western white pine	574	538	4	16	16
Engelmann spruce	546	515	15	16	—
Western redcedar	460	218	68	65	109
Western hemlock	324	299	6	5	14
Total	19,825	8,241	5,792	1,588	4,204
Hardwoods[1]	297	36	185	35	41
All species	20,122	8,277	5,977	1,623	4,245

[1] *Includes primarily paper birch, quaking aspen, and black cottonwood.*

Table 22. — Volume of growing stock on commercial forest land, by species and diameter class, Inland Empire area, Washington, January 1, 1969
(In million cubic feet)

Species	Diameter class (inches at breast height)											
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0-38.9	39.0 and larger
Softwoods:												
Douglas-fir	1,995	191	232	289	249	229	168	154	123	288	59	13
Grand fir	507	41	60	66	63	51	47	42	33	73	29	2
Subalpine fir	269	32	46	47	33	28	23	20	11	25	4	—
Western larch	990	89	128	111	133	111	95	82	47	142	47	5
Ponderosa pine	1,466	79	107	115	129	152	130	142	121	336	143	12
Lodgepole pine	627	159	185	117	76	47	26	10	6	1	—	—
Western white pine	146	5	11	19	24	19	18	12	9	20	8	1
Engelmann spruce	141	7	14	12	19	19	16	17	9	21	6	1
Western redcedar	175	17	25	20	22	18	14	13	9	19	12	6
Western hemlock	94	6	13	11	8	9	7	9	5	20	5	1
Total	6,410	626	821	807	756	683	544	501	373	945	313	41
Hardwoods[1]	119	21	24	18	14	5	2	6	7	22	—	—
All species	6,529	647	845	825	770	688	546	507	380	967	313	41

[1] *Includes primarily red alder, white alder, paper birch, quaking aspen, and black cottonwood.*

Table 23. — Volume of sawtimber on commercial forest land, by species and diameter class, Inland Empire area, Washington, January 1, 1969 (International ¼-inch rule)
(In million board feet)

Species	Diameter class (inches at breast height)								
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0-38.9	39.0 and larger
Softwoods:									
Douglas-fir	7,073	1,170	1,157	921	880	743	1,760	368	74
Grand fir	1,888	312	275	270	242	192	422	166	9
Subalpine fir	827	181	148	136	120	66	153	23	—
Western larch	3,829	672	598	548	480	289	909	304	29
Ponderosa pine	6,807	594	760	704	797	716	2,137	1,012	87
Lodgepole pine	885	389	249	146	58	37	6	—	—
Western white pine	658	131	104	106	74	56	131	47	9
Engelmann spruce	638	100	102	95	96	60	135	44	6
Western redcedar	574	90	84	69	72	49	106	75	29
Western hemlock	373	41	44	41	50	34	125	37	1
Total	23,552	3,680	3,521	3,036	2,869	2,242	5,884	2,076	244
Hardwoods[1]	308	63	25	9	36	43	131	1	—
All species	23,860	3,743	3,546	3,045	2,905	2,285	6,015	2,077	244

[1] *Includes primarily paper birch, quaking aspen, and black cottonwood.*

Table 24. — Area of commercial forest land and volume of growing stock and sawtimber,[1] by stand age and ownership classes, Inland Empire area, Washington, January 1, 1969

Stand age class (years)	All ownerships[2]			Other public			Forest industry			Farmer and miscellaneous private		
	Area	Growing stock	Sawtimber	Area	Growing stock	Sawtimber	Area	Growing stock	Sawtimber	Area	Growing stock	Sawtimber
	Thousand acres	*Million cubic feet*	*Million board feet*	*Thousand acres*	*Million cubic feet*	*Million board feet*	*Thousand acres*	*Million cubic feet*	*Million board feet*	*Thousand acres*	*Million cubic feet*	*Million board feet*
Nonstocked	191	33	155	47	12	68	—	—	—	144	21	87
0-9	149	63	190	34	19	47	27	12	50	88	32	93
10-19	43	25	96	5	2	5	—	—	—	38	23	91
20-29	70	60	94	26	25	73	6	9	7	38	26	14
30-39	215	250	442	41	54	115	47	61	146	127	135	181
40-49	199	340	727	26	34	37	9	22	60	164	284	630
50-59	155	261	647	25	38	121	—	—	—	130	223	526
60-69	255	488	1,396	66	199	566	11	28	71	178	261	759
70-79	154	338	1,008	64	154	567	4	18	73	86	166	368
80-89	49	92	324	9	14	44	9	16	35	31	62	245
90-99	45	110	436	16	36	147	—	—	—	29	74	289
100-119	26	74	275	5	17	73	16	49	168	5	8	34
120-139	37	36	192	37	36	192	—	—	—	—	—	—
140-159	32	63	329	30	60	317	2	3	12	—	—	—
160-179	14	20	102	14	20	102	—	—	—	—	—	—
180-199	7	4	26	—	—	—	7	4	26	—	—	—
200 and over	6	5	28	—	—	—	—	—	—	6	5	28
Uneven-aged under rotation age	933	1,622	6,340	402	733	3,309	152	307	1,164	379	582	1,867
Uneven-aged over rotation age	118	265	1,375	100	234	1,225	12	25	116	6	6	34
All classes	2,698	4,149	14,182	947	1,687	7,008	302	554	1,928	1,449	1,908	5,246

[1] *International ¼-inch rule.*

[2] *Although stand age data are available for the Umatilla National Forest, they are not available for the Colville and Kaniksu National Forests. Consequently, none are shown in this table. The total acres and volumes of the National Forests are as follows:*

National Forest	*Thousand acres*	*Million cubic feet*	*Million board feet*
Colville	837	1,302	5,047
Kaniksu	257	551	2,124
Umatilla	147	527	2,507

Table 25. — Net annual growth of growing stock on commercial forest land, by species and ownership class, Inland Empire area, Washington, 1968[1]
(In thousand cubic feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Douglas-fir	55,000	8,700	10,600	8,800	26,900
Grand fir	8,400	4,300	−1,300[2]	2,000	3,400
Subalpine fir	5,600	3,800	600	100	1,100
Western larch	15,900	6,200	2,700	1,000	6,000
Ponderosa pine	29,700	1,300	8,900	2,100	17,400
Lodgepole pine	20,200	7,700	3,900	1,300	7,300
Western white pine	−1,300[2]	−1,000[2]	100	200	−600[2]
Engelmann spruce	2,300	2,000	—	200	100
Western redcedar	7,000	1,100	1,400	2,800	1,700
Western hemlock	2,300	1,500	100	400	300
Total	145,100	35,600	27,000	18,900	63,600
Hardwoods[3]	2,700	800	500	500	900
All species	147,800	36,400	27,500	19,400	64,500

[1] *See "Inventory Procedures" for an explanation of the actual periods over which growth was measured.*

[2] *Negative growth results from annual mortality exceeding gross annual growth.*

[3] *Includes primarily red alder, white alder, paper birch, quaking aspen, and black cottonwood.*

Table 26. — Net annual growth of sawtimber on commercial forest land, by species and ownership class, Inland Empire area, Washington, 1968[1] *(International ¼-inch rule)*

(In thousand board feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Douglas-fir	190,000	46,200	24,400	20,500	98,900
Grand fir	40,600	20,900	–7,500[2]	1,600	25,600
Subalpine fir	17,300	12,500	—	4,100	700
Western larch	84,700	33,900	28,700	3,800	18,300
Ponderosa pine	156,200	12,000	46,300	13,800	84,100
Lodgepole pine	40,900	8,900	16,600	7,400	8,000
Western white pine	–6,700[2]	–7,400[2]	2,000	600	–1,900[2]
Engelmann spruce	8,900	8,000	300	600	—
Western redcedar	21,500	3,700	3,800	5,500	8,500
Western hemlock	7,300	5,000	300	1,300	700
Total	560,700	143,700	114,900	59,200	242,900
Hardwoods[3]	6,200	800	3,300	1,000	1,100
All species	566,900	144,500	118,200	60,200	244,000

[1] *See "Inventory Procedures" for an explanation of growth estimates and the actual periods over which growth was measured.*

[2] *Negative growth results from annual mortality exceeding gross annual growth.*

[3] *Includes primarily paper birch, quaking aspen, and black cottonwood.*

Table 27. — Net annual growth of sawtimber on commercial forest land, by species and ownership class, Inland Empire area, Washington, 1968[1] *(Scribner rule)*
(In thousand board feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Douglas-fir	152,200	38,000	19,600	16,800	77,800
Grand fir	32,900	16,500	-6,200[2]	1,500	21,100
Subalpine fir	14,500	10,800	—	3,000	700
Western larch	65,400	27,900	20,700	3,400	13,400
Ponderosa pine	136,000	9,900	42,100	12,000	72,000
Lodgepole pine	33,300	8,000	12,700	5,900	6,700
Western white pine	-5,600[2]	-6,300[2]	1,400	600	-1,300[2]
Engelmann spruce	8,100	7,200	300	600	—
Western redcedar	17,200	3,000	3,400	4,300	6,500
Western hemlock	6,300	4,400	300	1,000	600
Total	460,300	119,400	94,300	49,100	197,500
Hardwoods[3]	6,100	700	3,300	1,000	1,100
All species	466,400	120,100	97,600	50,100	198,600

[1] *See "Inventory Procedures" for an explanation of growth estimates and the actual periods over which growth was measured.*

[2] *Negative growth results from annual mortality exceeding gross annual growth.*

[3] *Includes paper birch, quaking aspen, and black cottonwood.*

Table 28. — Net annual growth of growing stock on commercial forest land, by species and county, Inland Empire area, Washington, 1968[1]

(In thousand cubic feet)

Species	All counties	Asotin	Columbia	Ferry	Garfield	Lincoln	Pend Oreille	Spokane	Stevens	Walla Walla	Whitman
Softwoods:											
Douglas-fir	55,000	400	2,300	10,900	700	1,000	9,700	4,500	25,400	—	100
Grand fir	8,400	400	1,700	−800[2]	1,000	—	2,000	1,500	2,600	—	—
Subalpine fir	5,600	([3])	400	1,500	200	—	2,900	—	600	—	—
Western larch	15,900	([3])	100	4,300	([3])	—	4,100	700	6,700	—	—
Ponderosa pine	29,700	300	200	4,900	—	1,800	2,000	7,300	12,800	100	300
Lodgepole pine	20,200	100	([3])	5,400	([3])	—	6,600	1,300	6,800	—	—
Western white pine	−1,300[2]	—	—	−900[2]	—	—	—	—	−400[2]	—	—
Engelmann spruce	2,300	100	400	500	200	—	1,000	—	100	—	—
Western redcedar	7,000	—	—	400	—	—	2,600	1,100	2,900	—	—
Western hemlock	2,300	—	—	100	—	—	1,900	100	200	—	—
Total	145,100	1,300	5,100	26,300	2,100	2,800	32,800	16,500	57,700	100	400
Hardwoods[4]	2,700	—	—	600	—	—	700	−200[2]	1,700	−100[2]	—
All species	147,800	1,300	5,100	26,900	2,100	2,800	33,500	16,300	59,400	—	400

[1] *See "Inventory Procedures" for an explanation of growth estimates and the actual periods over which growth was measured.*

[2] *Negative growth results from annual mortality exceeding gross annual growth.*

[3] *Less than 50,000 cubic feet.*

[4] *Includes red alder, white alder, paper birch, quaking apsen, and black cottonwood.*

Table 29. — Net annual growth of sawtimber on commercial forest land, by species and county, Inland Empire area, Washington, 1968[1] *(International ¼-inch rule)*
(In thousand board feet)

Species	All counties	Asotin	Columbia	Ferry	Garfield	Lincoln	Pend Oreille	Spokane	Stevens	Walla Walla	Whitman
Softwoods:											
Douglas-fir	190,000	2,800	19,000	42,500	5,500	2,000	43,000	14,300	59,300	300	1,300
Grand fir	40,600	1,600	8,600	−6,700[2]	6,200	—	6,000	9,600	15,300	—	—
Subalpine fir	17,300	100	500	4,200	([3])	—	10,100	100	2,300	—	—
Western larch	84,700	1,100	4,900	19,200	−100[2]	—	22,600	3,000	34,000	—	—
Ponderosa pine	156,200	2,700	2,800	29,000	1,200	7,300	11,500	31,600	67,900	700	1,500
Lodgepole pine	40,900	([3])	900	5,900	100	—	8,200	−400[2]	26,200	—	—
Western white pine	−6,700[2]	—	—	−5,400[2]	—	—	−1,000[2]	100	−400[2]	—	—
Engelmann spruce	8,900	200	1,300	2,700	300	—	3,400	—	1,000	—	—
Western redcedar	21,500	—	—	1,500	—	—	8,800	3,900	7,300	—	—
Western hemlock	7,300	—	—	400	—	—	5,900	500	500	—	—
Total	560,700	8,500	38,000	93,300	13,200	9,300	118,500	62,700	213,400	1,000	2,800
Hardwoods[4]	6,200	—	200	100	—	—	1,000	—	4,900	—	—
All species	566,900	8,500	38,200	93,400	13,200	9,300	119,500	62,700	218,300	1,000	2,800

[1] *See "Inventory Procedures" for an explanation of growth estimates and the actual periods over which growth was measured.*

[2] *Negative growth results from annual mortality exceeding gross annual growth.*

[3] *Less than 50,000 board feet.*

[4] *Includes primarily paper birch, quaking aspen, and black cottonwood.*

Table 30. — Average annual mortality of growing stock on commercial forest land, by species and owership class, Inland Empire area, Washington, 1968[1]

(In thousand cubic feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Douglas-fir	15,400	4,100	8,600	500	2,200
Grand fir	7,700	2,200	3,500	600	1,400
Subalpine fir	2,000	1,900	—	100	2,100
Western larch	7,300	3,600	1,900	400	1,400
Ponderosa pine	6,100	1,300	2,200	200	2,400
Lodgepole pine	6,100	2,100	1,800	100	2,100
Western white pine	5,900	5,200	—	—	700
Engelmann spruce	1,100	1,000	100	—	—
Western redcedar	300	300	—	—	—
Western hemlock	400	400	—	—	—
Total	52,300	22,100	18,100	1,900	10,200
Hardwoods[2]	800	200	500	—	100
All species	53,100	22,300	18,600	1,900	10,300

[1] *See "Inventory Procedures" for details on the mortality estimates and periods over which mortality was estimated.*

[2] *Includes primarily paper birch, quaking aspen, and black cottonwood.*

Table 31. — Average annual mortality of sawtimber on commercial forest land, by species and ownership class, Inland Empire area, Washington, 1968[1] (International ¼-inch rule)
(*In thousand board feet*)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Douglas-fir	67,000	16,300	45,500	2,400	2,800
Grand fir	35,200	11,200	17,100	3,400	3,500
Subalpine fir	6,300	6,300	—	—	—
Western larch	27,500	15,900	8,000	—	3,600
Ponderosa pine	25,700	7,900	10,100	800	6,900
Lodgepole pine	8,300	2,900	3,000	—	2,400
Western white pine	26,700	24,400	—	—	2,300
Engelmann spruce	5,100	4,800	300	—	—
Western redcedar	1,400	1,400	—	—	—
Western hemlock	1,800	1,800	—	—	—
Total	205,000	92,900	84,000	6,600	21,500
Hardwoods[2]	300	300	—	—	—
All species	205,300	93,200	84,000	6,600	21,500

[1] *See "Inventory Procedures" for details on the mortality estimates and periods over which mortality was estimated.*

[2] *Includes primarily paper birch, quaking aspen, and black cottonwood.*

Table 32. — Average annual mortality of sawtimber on commercial forest land, by species and ownership class, Inland Empire area, Washington, 1968[1] *(Scribner rule)*
(In thousand board feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Douglas-fir	58,200	14,100	40,100	1,800	2,200
Grand fir	29,900	9,900	14,200	2,900	2,900
Subalpine fir	5,300	5,300	—	—	—
Western larch	22,200	13,600	5,800	—	2,800
Ponderosa pine	21,300	7,000	8,000	600	5,700
Lodgepole pine	6,800	2,600	2,300	—	1,900
Western white pine	22,200	20,600	—	—	1,600
Engelmann spruce	4,300	4,100	200	—	—
Western redcedar	1,200	1,200	—	—	—
Western hemlock	1,600	1,600	—	—	—
Total	173,000	80,000	70,600	5,300	17,100
Hardwoods[2]	200	200	—	—	—
All species	173,200	80,200	70,600	5,300	17,100

[1] *See "Inventory Procedures" for details on the mortality estimates and periods over which mortality was estimated.*

[2] *Includes primarily paper birch, quaking aspen, and black cottonwood.*

Table 33. — Average annual mortality of growing stock on commercial forest land, by species and county, Inland Empire area, Washington, 1968[1]
(In thousand cubic feet)

Species	All counties	Asotin	Columbia	Ferry	Garfield	Lincoln	Pend Oreille	Spokane	Stevens	Walla Walla	Whitman
Softwoods:											
Douglas-fir	15,400	100	500	6,000	200	—	2,000	100	6,400	100	—
Grand fir	7,700	200	1,000	2,400	700	—	1,700	300	1,200	200	—
Subalpine fir	2,000	([2])	400	600	100	—	500	100	300	—	—
Western larch	7,300	500	300	3,100	100	—	1,200	200	1,900	—	—
Ponderosa pine	6,100	500	400	3,300	400	400	300	400	400	—	—
Lodgepole pine	6,100	100	100	1,400	100	—	2,200	900	1,300	—	—
Western white pine	5,900	—	—	1,500	—	—	3,400	—	1,000	—	—
Engelmann spruce	1,100	100	200	200	100	—	200	—	300	—	—
Western redcedar	300	—	—	—	—	—	300	—	—	—	—
Western hemlock	400	—	—	—	—	—	400	—	—	—	—
Total	52,300	1,500	2,900	18,500	1,700	400	12,200	2,000	12,800	300	—
Hardwoods[3]	800	—	—	100	—	—	100	400	100	100	—
All species	53,100	1,500	2,900	18,600	1,700	400	12,300	2,400	12,900	400	—

[1] *See "Inventory Procedures" for details on the mortality estimates and periods over which mortality was estimated.*

[2] *Less than 50,000 cubic feet.*

[3] *Includes primarily paper birch, quaking aspen, and black cottonwood.*

Table 34. — Average annual mortality of sawtimber on commercial forest land, by species and county, Inland Empire area, Washington, 1968[1] *(International 1/4-inch rule)*

(In thousand board feet)

Species	All counties	Asotin	Columbia	Ferry	Garfield	Lincoln	Pend Oreille	Spokane	Stevens	Walla Walla	Whitman
Softwoods:											
Douglas-fir	67,000	300	2,300	29,300	700	—	4,700	—	29,500	200	—
Grand fir	35,200	1,000	6,200	11,200	2,600	—	8,000	500	5,400	300	—
Subalpine fir	6,300	100	1,200	2,000	100	—	1,800	—	1,100	—	—
Western larch	27,500	200	1,300	15,600	500	—	4,100	—	5,800	—	—
Ponderosa pine	25,700	1,700	2,200	16,800	1,400	—	1,300	800	1,500	—	—
Lodgepole pine	8,300	([2])	200	4,100	100	—	1,000	2,400	500	—	—
Western white pine	26,700	—	—	8,000	—	—	14,400	—	4,300	—	—
Engelmann spruce	5,100	400	1,100	1,000	600	—	1,200	—	800	—	—
Western redcedar	1,400	—	—	200	—	—	1,100	—	100	—	—
Western hemlock	1,800	—	—	100	—	—	1,500	—	200	—	—
Total	205,000	3,700	14,500	88,300	6,000	—	39,100	3,700	49,200	500	—
Hardwoods[3]	300	—	—	100	—	—	200	([2])	—	—	—
All species	205,300	3,700	14,500	88,400	6,000	—	39,300	3,700	49,200	500	—

[1] *See "Inventory Procedures" for details on the mortality estimates and periods over which mortality was estimated.*

[2] *Less than 50,000 board feet.*

[3] *Includes primarily paper birch, quaking aspen, and black cottonwood.*

Table 35. — Average annual mortality[1] of growing stock and sawtimber on commercial forest land, by causes of death and by softwoods and hardwoods, Inland Empire area, Washington, 1968

Cause of Death	Growing stock			Sawtimber (International ¼-inch rule)			Sawtimber (Scribner rule)		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			*Thousand board feet*					
Fire	2,700	2,700	—	12,500	12,500	—	10,000	10,000	—
Insects	7,600	7,600	—	29,700	29,700	—	25,700	25,700	—
Disease	2,900	2,900	—	12,400	12,400	—	9,800	9,800	
Weather	8,400	7,900	500	26,900	26,900	—	21,700	21,700	—
Other[2]	2,000	1,900	100	1,500	1,500	—	1,200	1,200	—
Unknown	7,200	7,200	—	29,100	29,100	—	24,600	24,600	—
All causes	30,800	30,200	600	112,100	112,100	—	93,000	93,000	—

[1] *Data not available for National Forests.*

[2] *Mostly logging-killed, with some trees killed by animals and suppression.*

Table 36. — Net volume of salvable dead sawtimber[1] on commercial forest land, by volume-per-acre class, Inland Empire area, Washington, January 1, 1969

Volume-per-acre class	All counties
	Thousand cubic feet
Cubic feet:	
1-199	25,200
200-499	11,700
500-999	4,900
1,000-1,999	7,000
2,000 or more	—
All classes	48,800
	Thousand board feet, International ¼-inch rule
Board feet:	
1-499	44,500
500-999	75,100
1,000-2,499	70,900
2,500-4,999	—
5,000-9,999	72,600
10,000 or more	—
All classes	263,100
	Thousand board feet, Scribner rule
Board feet:	
1-499	49,500
500-999	62,200
1,000-2,499	45,400
2,500-4,999	—
5,000-9,999	65,200
10,000 or more	—
All classes	222,300

[1]*Data not available for National Forests.*

Table 37. — Net volume of salvable dead sawtimber[1] on commercial forest land by species, Inland Empire area, Washington, January 1, 1969

Species	Cubic Feet	Int. ¼-inch rule	Scribner rule
	Thousand cubic feet	*Thousand board feet*	
Douglas-fir	16,900	86,700	70,900
Grand fir	800	3,700	3,100
Subalpine fir	—	—	—
Western larch	24,600	137,900	118,700
Ponderosa pine	5,100	28,700	24,900
Lodgepole pine	500	2,600	2,000
Engelmann spruce	200	1,200	900
Western redcedar	700	2,300	1,800
All species	48,800	263,100	222,300

[1]*Data not available for National Forests.*

Table 38. — Timber harvest by ownership class, Inland Empire Area, Washington, 1950-71 (International ¼-inch rule)
(In thousand board feet)

Year	All ownerships			Private[1]			State			National Forest			Other public		
	Total	Live	Dead[2]	Total	Live	Dead[2]	Total	Live	Dead[2]	Total	Live	Dead[2]	Total	Live	Dead[2]
1950	159,506	([3])	([3])	—	—	—	61,272	([3])	([3])	44,875	([3])	([3])	53,359	([3])	([3])
1951	227,811	([3])	([3])	—	—	—	130,387	([3])	([3])	45,354	([3])	([3])	52,070	([3])	([3])
1952	241,891	241,321	570	—	—	—	126,388	126,214	174	55,210	54,814	396	60,293	60,293	—
1953	242,620	([3])	([3])	—	—	—	141,058	141,058	—	39,037	([3])	([3])	62,525	62,525	—
1954	270,472	270,442	30	—	—	—	159,940	159,940	—	55,973	55,973	—	54,559	54,529	30
1955	300,550	298,036	2,514	177,291	177,291	—	6,134	6,134	—	53,389	50,875	2,514	63,736	63,736	—
1956	329,931	328,380	1,551	180,703	180,692	11	544	544	—	69,967	68,427	1,540	78,717	78,717	—
1957	298,302	298,172	130	164,275	164,275	—	2,679	2,679	—	73,359	73,234	125	57,989	57,984	5
1958	336,342	334,395	1,947	169,118	169,116	2	962	962	—	88,446	86,520	1,926	77,816	77,797	19
1959	403,174	397,764	5,410	187,513	187,268	245	2,451	2,451	—	100,397	95,232	5,165	112,813	112,813	—
1960	329,524	327,324	2,200	169,868	168,809	1,059	3,523	3,431	92	81,346	80,297	1,049	74,787	74,787	—
1961	320,197	310,850	9,347	126,024	117,336	8,688	2,109	2,006	103	107,696	107,140	556	84,368	84,368	—
1962	374,623	369,609	5,014	136,755	135,651	1,104	8,371	8,371	—	134,245	130,458	3,787	95,252	95,129	123
1963	402,748	400,148	2,600	119,863	119,146	717	9,429	9,339	90	167,696	165,903	1,793	105,760	105,760	—
1964	412,178	410,776	1,402	127,632	127,632	—	8,707	8,707	—	171,913	170,511	1,402	103,926	103,926	—
1965	385,238	384,385	853	105,998	105,977	21	20,214	20,214	—	138,126	137,294	832	120,900	120,900	—
1966	398,154	398,128	26	134,249	134,223	26	12,172	12,172	—	149,550	149,550	—	102,183	102,183	—
1967	397,539	383,001	14,538	103,215	103,215	—	22,574	22,574	—	164,889	150,522	14,367	106,861	106,690	171
1968	468,189	464,344	3,845	131,000	131,000	—	35,683	35,683	—	161,202	159,967	1,235	140,304	137,694	2,610
1969	413,399	410,216	3,183	125,542	125,542	—	27,205	27,081	124	159,025	155,966	3,059	101,627	101,627	—
1970	381,494	378,975	2,519	135,354	135,133	221	5,176	5,129	47	159,286	157,035	2,251	81,678	81,678	—
1971	406,473	404,453	2,020	143,101	141,526	1,575	19,583	19,532	51	135,767	135,373	394	108,022	108,022	—

[1] *Data for private ownership are combined with State ownership for 1950-54.*

[2] *Includes snags and down material existing before logging. Salvage of this material does not constitute drain on the volume of the forest inventory of live trees.*

[3] *Data not available.*

ACCURACY OF CURRENT INVENTORY DATA

Forest land area and timber volume

The estimates of forest land area and timber volume in the Washington Inland Empire area were derived by sampling and consequently have sampling errors. Sampling errors have been computed for the estimates of commercial forest land area, noncommercial forest land area, net cubic-foot volume of growing stock, and net board-foot volume (International ¼-inch rule) of sawtimber. These sampling errors are presented in table 39 as a percent of the estimated total at the 68-percent and 95-percent probability levels. They may be interpreted as meaning that the odds are two out of three for the 68-percent probability, or 19 out of 20 for 95-percent probability, that the ranges shown include the true value (i.e., the results of a 100-percent inventory). For example, we can expect, with 95-percent confidence, that the estimate of total commercial forest land area — 3,938,000 acres ±2.7 percent (106,326 acres) — includes the true value.

In addition to measurable sampling errors, there may be other nonsampling errors due to mistakes in judgment, measurement, and compilation. The magnitude of errors from these sources cannot be determined. However, such errors are kept to a minimum through training, supervision, field checking, and complete editing and machine verification in compiling the data.

The sampling error of any breakdown of these totals will be substantially greater than for the total. The smaller the breakdown, the larger the sampling error. An approximation of the increasing sampling error can be obtained from table 40, which shows the sampling error associated with smaller estimates.

Table 39. — Sampling errors of estimates of forest area and timber volume, Inland Empire area, Washington, January 1, 1969

Item	Estimated total	Sampling error in percent	
		68-percent probability	95 percent probability
Commercial forest land	3,938,000 acres[1]	±1.4	±2.7
Noncommercial forest land	255,000 acres[1]	±7.4	±9.4
Volume:			
Growing stock	6,529 million cubic feet	±1.8	±3.5
Sawtimber (International ¼-inch rule)	23,860 million board feet	±2.2	±4.3

[1]*Of the estimated 3,938,000 acres of commercial forest and of the estimated 255,000 acres of noncommercial forest land, 1,095,000 acres of commercial forest land and 92,000 acres of noncommercial forest land were classified by type-mapping procedures and have no associated sampling error.*

Table 40. — Approximate sampling error by size of estimate, Inland Empire area, Washington, January 1, 1969

Commercial forest land		Growing stock		Sawtimber	
Area	Sampling error[1]	Volume	Sampling error[1]	Volume	Sampling error[1]
Thousand acres	*Percent*	*Million cubic feet*	*Percent*	*Million board feet*[2]	*Percent*
2,843	1.4	6,529	1.8		
1,393	2.0	5,288	2.0	23,860	2.2
619	3.0	2,350	3.0	12,831	3.0
348	4.0	1,322	4.0	7,218	4.0
223	5.0	846	5.0	4,619	5.0
56	10.0	211	10.0	1,154	10.0
24	15.0	94	15.0	513	15.0
14	20.0	53	20.0	289	20.0
9	25.0	34	25.0	184	25.0
6	30.0	23	30.0	128	30.0
4	35.0	17	35.0	94	35.0
3	40.0	13	40.0	72	40.0
		8	50.0	46	50.0
		2	100.0	11	100.0

[1] *By random sampling; 68-percent probability.*

[2] *International ¼-inch rule.*

INVENTORY PROCEDURES

The summary tables in this report include data from the inventories of the Colville, Kaniksu, and Umatilla National Forests, conducted by the Division of Timber Management, Region 1 for the Colville and Kaniksu and Region 6 for the Umatilla, U.S. Forest Service; and data from the inventory of lands outside the National Forests, conducted by the Forest Survey project, Pacific Northwest Forest and Range Experiment Station. National Forest lands were inventoried in 1964, 1968, and 1969 for the Colville, Umatilla, and Kaniksu National Forests, respectively. Lands outside the National Forests were inventoried in 1968. No updating was done to bring data to a common date. The same general standards and definitions were used for both National Forests and lands outside the National Forests, except as follows.

National Forest Lands

For the Umatilla and Colville National Forests, field plots were distributed on a systematic grid at 1.7 - and 4.0-mile intervals, respectively. The Kaniksu National Forest chose field plots from a photo grid on randomly selected photos.

Field plots on all three National Forests consisted of 10 sample points distributed systematically over an acre. The variable-radius plot sampling principle was used at each point to select the trees to be tallied. Where no trees were tallied, a ground cover class was recorded. Summations of the 10-point tally expressed the timber resources and conditions for that acre and were used to estimate forest area and volume. There were 223, 37, and 78 plots established on the Colville, Kaniksu, and Umatilla National Forests, respectively.

Growth estimates for the National Forests were based on readings from increment borings. Multiple regression equations were used to estimate tree diameter 1 year prior to 1968 on the 10-point plots, and net volume was computed for both present and past dia meters. Gross growth was obtained by subtracting past from present net volume.

Estimates of annual mortality were based on the tally of trees estimated to have died within the 5 years preceding the data of the present inventory except on the Umatilla National Forest where mortality was determined from remeasurement of plots established 10 years previously.

Lands Outside National Forests

A double sampling design was used for lands outside the National Forests. In the first stage, aerial photo sample plots were distributed systematically across the area. Photo plots were classified into one of the three major land classes — commercial forest, noncommercial forest, and nonforest — and the commercial forest plots were further classified into stand volume classes. All photo plots were classified by kind of owner from public records. Approximately 10,200 photo plots were examined. The second stage consisted of a basic systematic grid of field plots 3.4 miles apart with supplemental plots added. A total of 414 field plots were established at photo plot locations. Plots consisted of 10 sample points distributed systematically over an acre. Other plot procedures used were the same as previously described for the National Forests.

In addition to the two-stage sample using 10-point variable-radius plots, previously established 1/5-acre plots were remeasured in all of the State's Inland Empire Counties. The

remeasured data were used to develop multiple regression equations of diameter growth, which in turn was used to estimate diameter for the year prior to 1968 for all trees on the 10-point variable-radius inventory plots. Net volume was computed for both past and present diameters, and gross growth was obtained by subtracting past from present net volume. Variables in the regression equations included d.b.h., average stand diameter, basal area per acre, tree age, crown ratio, site index, and combinations of these.

Annual mortality estimates were based on the tally of dead trees recorded as live on the originally established 1/5-acre subplots.

Timber Harvest

The timber harvest figures used in this report have been obtained from various agencies using varying standards and methods of reporting. These timber cut figures are therefore not strictly comparable with Forest Survey's reported volume statistics but are considered adequate for the analyses made.

DEFINITIONS OF TERMS

Land Area

Total Land Area

Includes dry land and land temporarily or partially covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, and canals less than one-eighth mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

Forest Land Area

Land at least 16.7 percent stocked by trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. Minimum area of forest land recognized is 1 acre.

Nonforest Land Area

Land that has never supported forests and land formerly forested where use for timber management is precluded by development for other uses. Included are areas used for agricultural crops, improved pasture, residential areas, city parks, improved roads of any width and right-of-way clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and other nonforest strips must be more than 120 feet wide, and clearings, etc., more than 1 acre in size, to qualify as nonforest land.

Forest Land Classes

Commercial Forest Land Area

Forest land which is producing or capable of producing industrial wood and not withdrawn from timber utilization.

Noncommercial Forest Land Area

Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive public forest land withdrawn from commercial timber use through statute or administrative regulation.

Productive-reserved. — Public forest land withdrawn from timber utilization through statute, ordinance, or administrative order, but which otherwise qualifies as commercial forest land. Also included are forest lands managed exclusively for Christmas tree production and deferred lands on National Forests set aside for study as to land use allocation.

Unproductive. — Forest land incapable of yielding crops of industrial wood products because of adverse site conditions such as sterile soil, poor drainage, high elevation, steepness, and rockiness.

Forest Types

Forest types are determined on the basis of species plurality of all live trees that contribute to stocking, considering both size and spacing.

Tree Classes

Growing-stock Trees

Sawtimber trees, poletimber trees, saplings, and seedlings, i.e., all live trees except cull trees.

Sawtimber trees (11.0-inch d.b.h. and larger). — Live trees of commercial species. Softwood trees must contain at least one

12-foot saw log with a top diameter not less than 6 inches inside bark; hardwood trees must contain at least one 8-foot saw log with a top diameter not less than 8 inches inside bark. At least 25 percent of the board-foot volume in a tree must be free of defect.

Poletimber trees (5.0- to 10.9-inch d.b.h.). — Live trees of commercial species not less than 50-percent sound on a cubic-foot basis and with no disease, defects, or deformities which are likely to prevent their becoming growing-stock sawtimber trees.

Sapling and seedling trees (less than 5.0-inch d.b.h.). — Live trees of commercial species with no disease, defects, or deformities which are likely to prevent their becoming growing-stock poletimber trees.

Nongrowing-stock Trees

Cull trees. — Trees of noncommercial species and trees of commercial species which are too defective or which are unlikely to become growing-stock trees due to deformity, disease, low vigor, etc.

Sound cull trees. — Trees of noncommercial species or with excessive defect due to form, roughness, etc.

Rotton cull trees. — Trees with excessive defect due primarily to rot.

Mortality trees. — Trees of commercial species which have died from natural causes within a specified period and which were not cull trees at the time of death.

Salvable dead trees. — Standing or down dead trees of commercial species 11.0 inches or more in diameter that contain 25 percent or more of sound volume and at least one merchantable 16-foot log if a softwood or one merchantable 8-foot log if a hardwood.

Stand-size Classes

Sawtimber Stand

Stand at least 16.7 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees, and with sawtimber stocking equal to or greater than poletimber stocking.

Large sawtimber stand. — Stand in which the majority of the sawtimber stocking is in trees 21.0-inch d.b.h. and larger.

Small sawtimber stand. — Stand in which the majority of the sawtimber stocking is in trees from 11.0- to 20.9-inch d.b.h.

Poletimber Stand

Stand at least 16.7 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees, and with poletimber stocking exceeding sawtimber stocking.

Sapling and Seedling Stand

Stand at least 16.7 percent stocked with growing-stock trees, with more than half of this stocking in saplings and/or seedlings.

Nonstocked Area

An area of commercial forest land less than 16.7 percent stocked with growing-stock trees.

Stocking

Stocking is an expression of the extent to which growing space is effectively utilized by present or potential growing-stock trees of commercial species. "Percent of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

Age

Stand Age

Stand age is based upon growing-stock stocking. In order for a stand to be even-aged a majority of the growing-stock stocking must be in two adjacent age classes. Stands that do not meet this criterion are classified as uneven-aged.

Old-growth Sawtimber Stand

Sawtimber stand in which 50 percent or more of the growing stock is in trees at least 140 years old.

Young-growth Sawtimber Stand

Sawtimber stand in which more than 50 percent of the growing stock is in trees less than 140 years old.

Timber Volume

Live Sawtimber Volume

Net volume in board feet of live sawtimber trees of commercial species. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Scribner rule. — The common board-foot log rule used in determining volume of sawtimber in Washington. Scribner volume in the Inland Empire area is measured in terms of 16-foot logs.

International ¼-inch rule.— The standard board-foot log rule adopted nationally by the Forest Service for the presentation of Forest Survey volume statistics.

Saw-log portion. — That part of the bole of sawtimber trees between the stump and the saw-log top. The saw-log top measured by the Scribner rule is variable and is 40 percent of d.b.h. but not less than 8.0 inches diameter outside bark. The top measured by the International rule is fixed at 6.0 inches diameter inside bark.

Upper-stem portion. — That part of the bole of sawtimber trees above the saw-log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs.

Growing-stock Volume

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot and missing bole sections.

Net Annual Growth

The increase in net volume of a specified size class for a specific year. (Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to the year's end, plus net volume of trees reaching the size class during the year, minus the net volume of trees that died during the year, minus the net volume of trees that became culls during the year.)

Ownership Classes

National Forest Lands

Federal lands which have been designated by Executive Order or statute as National Forest or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Other Public Lands

Federal lands other than National Forests, including lands administered by the Bureau of Land Management, Bureau of Indian Affairs, and miscellaneous Federal agencies, and lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Forest Industry Lands

Lands owned by companies or individuals operating wood-using plants.

Farmer-owned Lands

Lands owned by operators of farms.

Miscellaneous Private—Corporate Lands

Lands owned by companies or corporations that do not operate wood-using plants. Included are corporate farms, some railroad lands, oil company lands, real estate and landholding company lands, and lands held by banks and other financial institutions and various other companies and corporations.

Miscellaneous Private—Noncorporate Lands

Privately owned lands other than forest industry, farmer-owned, or corporate lands. Included are lands owned by individuals who have permanent or summer homesite lands outside city limits.

TREE SPECIES

Principal tree species found on the commercial forest land in the Inland Empire of Washington include:

Softwoods:

- Douglas-fir (*Pseudotsuga menziesii*)
- Engelmann spruce (*Picea engelmanii*)
- Grand fir (*Abies grandis*)
- Subalpine fir (*Abies lasiocarpa*)
- Lodgepole pine (*Pinus contorta*)
- Ponderosa pine (*Pinus ponderosa*)
- Western white pine (*Pinus monticola*)
- Western hemlock (*Tsuga heterophylla*)
- Western larch (*Larix occidentalis*)
- Western redcedar (*Thuja plicata*)

Hardwoods:

- Black cottonwood (*Populus trichocarpa*)
- Quaking aspen (*Populus tremuloides*)
- Red alder (*Alnus rubra*)
- White alder (*Alnus rhombifolia*)
- Paper birch (*Betula papyrifera*)

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CHECKLIST of Vertebrate Animals of the Cascade Head Experimental Forest

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ABSTRACT

Three months, April and August 1971 and August 1972, were spent studying the vertebrate fauna of Cascade Head Experimental Forest. The resulting annotated checklist includes 9 amphibians, 2 reptiles, 35 birds, and 40 mammals. A standardized animal habitat classification is presented in an effort to correlate the vertebrates in some meaningful way to their environment.

Keywords: Vertebrates, Cascade Head Experimental Forest.

Cascade Head Experimental Forest is a facility established by the U.S. Forest Service for research on the distinctive and very productive coastal "fogbelt" Sitka spruce (*Picea sitchensis*) and western hemlock (*Tsuga heterophylla*) forests of Oregon and Washington. Since its establishment in 1934, this 4,750-hectare (11,890-acre) tract has been jointly administered by the Pacific Northwest Forest and Range Experiment Station and Siuslaw National Forest as a site for basic biological research, experimentation in various forest management practices, and education. Accumulating information makes Cascade Head increasingly valuable as a resource for scientists and educators concerned with coastal forests.

Chris and Rita Maser spent 3 months (April 1971, August 1971, and August 1972) studying the fauna of the Experimental Forest as part of a larger study of the natural history of the entire Oregon coast. Data were collected on the abundance of various animals and their habitat preferences and food habits.

This checklist has been developed from those data plus some additional research on correlation of animal distributions with major plant communities. It is intended as a basis for further research on the fauna of the area and to provide other scientists and educators, as well as casual visitors, with information on the abundance and distribution of the vertebrates at Cascade Head. The lists of amphibians, reptiles, and mammals are considered reasonably complete; the bird list is only a partial checklist. Individuals wishing more information or identification are referred to appropriate field manuals (Peterson 1961, Burt and Grossenheider 1964, Stebbins 1966).[1/]

This report is in seven parts: (1) Introductory information on the physical features of Cascade Head Experimental Forest and its animal habitats; annotated checklists for the (2) amphibians, (3) reptiles, (4) birds, and (5) mammals; (6) a tabular listing of other animals which may be present on the Experimental Forest; and (7) a table showing the occurrence of animal species by habitat.

[1/] We used the following references for scientific names: (1) amphibians and reptiles--Stebbins 1954, 1966, (2) birds--American Ornithologists' Union 1957, and (3) mammals--Hall and Kelson 1959, Johnson and Ostenson 1959, Johnson 1968. Therefore, this report differs from the suggested field manuals in the use and spelling of some scientific names and in the use of some common names of mammals.

LOCATION AND PHYSICAL DESCRIPTION

Cascade Head Experimental Forest overlooks the Pacific Ocean immediately north of the Salmon River between Neskowin and Otis, Oregon (Madison 1957). The rectangular tract extends approximately 6 miles inland from the ocean and averages 3 miles north to south (fig. 1).

The actual acreage of the Experimental Forest available for research is about 3,290 hectares (8,220 acres) of which about 83 percent supports Sitka spruce-western hemlock forest with the remainder covered by red alder (*Alnus rubra*). Portions of the forest have been clearcut and other areas thinned or partially cut in connection with numerous studies of timber harvest practices, ecology, and management of individual tree species (Madison 1957). The Neskowin Crest Research Natural Area has also been set aside in perpetuity to protect an example of the coniferous forests in a completely undisturbed state (Franklin et al. 1972).

The Experimental Forest lies astride a major ridge extending from the Coast Ranges and jutting into the Pacific Ocean as a headland. Topography is irregular, with steep slopes and dissected drainages near the ocean and gentle to moderately steep slopes along the top of the main ridge and in the eastern third of the area. Elevations range from sea level to a maximum of 525 meters (1,750 feet). The top of the main ridge has a general elevational range of 225 to 305 meters (750 to 1,000 feet). The headland is a result of the underlying basalt bedrock, which is more resistant to erosion than the surrounding sedimentary formations. Sedimentary materials cap the basalt in most locations, however, and have served as the parent material for the fertile, moderately deep soils which are characteristic of the Experimental Forest.

The coastal climate is wet and mild. Precipitation averages 2,440 millimeters (96 inches) annually, most of which falls from October through March; summers are relatively dry with an average precipitation of only 76 millimeters (3 inches). Summers are cool with frequent fogs on the headland and few days with maxima over 27° C (80° F). Winters are mild with January temperatures averaging about 5° C (40° F).

PLANT COMMUNITIES

The Experimental Forest lies within the coastal *Picea sitchensis* Zone of Franklin and Dyrness (1973). The major plant formation is mature coniferous forest composed of western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*), and Douglas-fir (*Pseudotsuga menziesii*) (fig. 2). These forest stands apparently originated after a major wildfire about 1850. They are generally dense and highly productive with dominant trees averaging 60 to 100 centimeters (25 to 40 inches) in diameter at breast height and 50 to 70 meters (150 to 210 feet) in height. Stand composition varies depending on the distance from the Pacific Ocean. The percentage of Sitka spruce is highest close to the ocean and declines in the eastern third of the Experimental Forest; conversely, Douglas-fir is rare close to the ocean and is common only in the eastern third.

Most of these mature stands have understories characteristic of the *Tsuga heterophylla/Polystichum munitum-Oxalis oregana* association which is considered to be the climax over much of this area. Development of

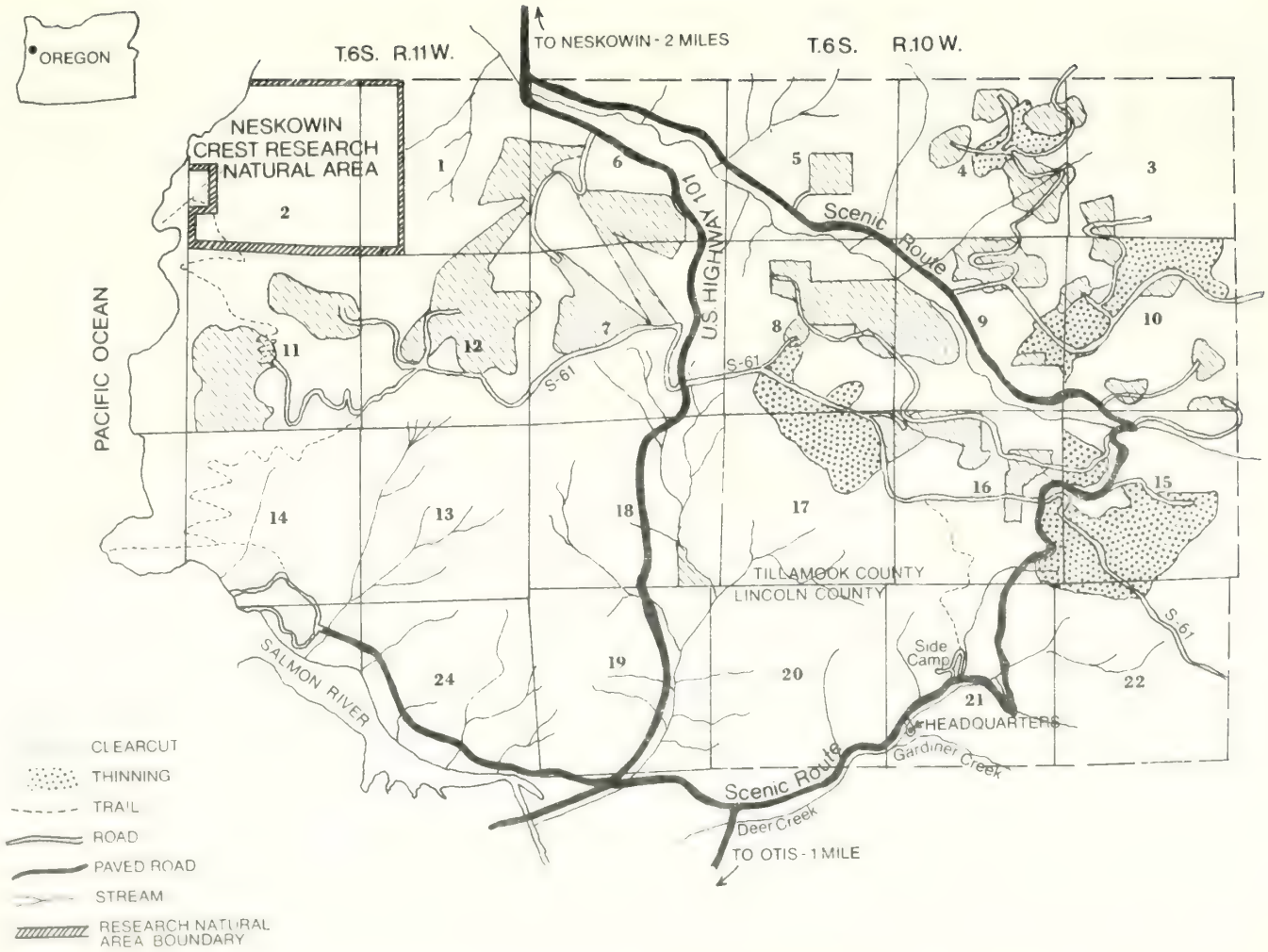

Figure 1.--Map of Cascade Head Experimental Forest showing roads and the major locations referred to in the checklist.

Figure 2.--Dense, 120-year-old stands of Sitka spruce and western hemlock (Mature Conifer) are the major forest cover on the Cascade Head Experimental Forest; red tree voles and flying squirrels inhabit such forests.

the shrub layer varies with overstory density, and in the densest stands shrubs are virtually absent except for scattered red huckleberry (*Vaccinium parvifolium*). In stands close to the coast (see Neskowin Crest Research Natural Area in Franklin et al. 1972) rustyleaf (*Menziesia ferruginea*) is the most common shrub. Devilsclub (*Oplopanax horridum*) is found in some wetter microsites, and in wet areas with relatively open canopies salmonberry (*Rubus spectabilis*) may form thickets. Herb layers are usually well developed in the mature forests and are characterized by swordfern (*Polystichum munitum*), Oregon oxalis (*Oxalis oregana*), false lily-of-the-valley (*Maianthemum dilatatum*), and the coolworts (*Tiarella trifoliata* and *T. unifoliata*). On moister microsites, several additional species are found such as ladyfern (*Athyrium filix-femina*) and deerfern (*Blechnum spicant*). A prominent ground cover of moss, dominantly *Eurhynchium oreganum*, is present. In the animal annotations we will refer to this community as the "Mature Conifer."

There are also substantial acreages of dense young coniferous forest which are a result of planting and natural seeding during the last 10 to 40 years (fig. 3). A mixture of Sitka spruce, western hemlock, and Douglas-fir is typical, sometimes with interspersed red alder. These stands grow very rapidly (Fujimori 1971); once the canopy closes, most of the understory is eliminated, leaving a forest floor which is nearly barren or partially covered by a carpet of moss along with scattered herbs. Dead branches on the boles may extend nearly to the ground. We will refer to this habitat as "Immature Conifer" in the annotations.

Figure 3.--Young, very dense conifer stands (Immature Conifer) have almost no understory and dead branches may extend nearly to ground level; red-backed voles are frequently found in such areas.

The mature red alder or mixed red alder-conifer communities are the second most abundant (fig. 4).[2/] With rare exception, these are seral or pioneer communities which are approaching maturity (based on senescence of the overstory red alder) despite their relatively young range of ages (35 to 50 years). Red alder is the most common dominant tree species with most 15 to 20 meters (45 to 60 feet) in height and 20 to 30 centimeters (8 to 12 inches) in diameter at breast height. Varying percentages of conifers may be present. Sitka spruce can be an associate in the overstory canopy or present as suppressed seedlings and saplings in the understory. Douglas-fir, if present, is usually a dominant, with its canopy above that of the red alder dominants. A dense shrubby understory of salmonberry is typical in these mature stands along with varying amounts of red elderberry (*Sambucus racemosa* var. *arborescens*). Vine maple (*Acer circinatum*) and thimbleberry (*Rubus parviflorus*) may also be present. The herbaceous layer is usually well represented, with swordfern, false lily-of-the-valley, and western springbeauty (*Montia sibirica*) most characteristic. The moss layer is generally poorly represented. Henderson[3/] has described a general sequence in understory development of red alder stands which begins primarily with herbs and culminates with dominance by salmonberry;

[2/] We include the mixed stands here because in overall composition and physiognomy and in terms of animal habitats they more nearly resemble alder than conifer stands (see, e.g., Franklin and Pechanec 1968 and Berntsen 1961).

[3/] Jan Alan Henderson. Biomass and composition of the understory vegetation in some *Alnus rubra* stands in western Oregon. M.S. thesis on file at Oregon State University, Corvallis, 64 p., 1970.

Figure 4.--Red alder or mixed alder-conifer stands (Alder/Salmonberry) often have dense understories of salmonberry; these communities provide habitat for the greatest variety of animals.

most of the Cascade Head stands appear to fall into the mature (later) stage of development. We will refer to this habitat as "Alder/Salmonberry" in the annotations.

A phase of this community usually dominates the edges of perennial streams. Streams provide some animal habitats not found in the more typical upland form of the habitat even though it is sometimes difficult to identify differences in the plants. Furthermore, the animals vary, depending upon the size of the stream. "Riparian Alder/Large Stream" will be used to denote habitat with larger streams which typically have stonier streambeds and broader, more frequently disturbed flood plains. "Riparian Alder/Small Stream" identifies habitats with permanent but small streams which are usually characterized by sandy or gravelly streambeds and minor flood plains.

Several other plant communities of minor extent are particularly important as habitats for animals not found elsewhere. Skunkcabbage (*Lysichitum americanum*) swales or marshes have standing, and often stagnant, water for at least part of the year (fig. 5). They are generally very small in area but have a distinctive herbaceous flora. We will refer to these areas as "Skunkcabbage Marsh" in the annotations. An oceanside headland prairie or herbland exists at the west end of Cascade Head (fig. 6). Its varied composition has been described by Davidson.[4/] We will refer to this habitat as "Headland Prairie." A pasture has been maintained at the headquarters site for more than 40 years (fig. 7); we will refer to this habitat as "Pasture."

4/ Eric Duncan Davidson. Synecological features of a natural headland prairie in the Oregon coast. M.S. thesis on file at Oregon State University, Corvallis, 79 p., 1967.

Figure 5.--Marshy areas characterized by skunkcabbage (Skunkcabbage Marsh) are found in wet, poorly drained sites; red-legged frogs and marsh shrews are found in this habitat.

Figure 6.--An oceanside prairie or herbland (Headland Prairie) is found at the end of Cascade Head; red-tailed hawks hunt vagrant shrews and Townsend voles in this area.

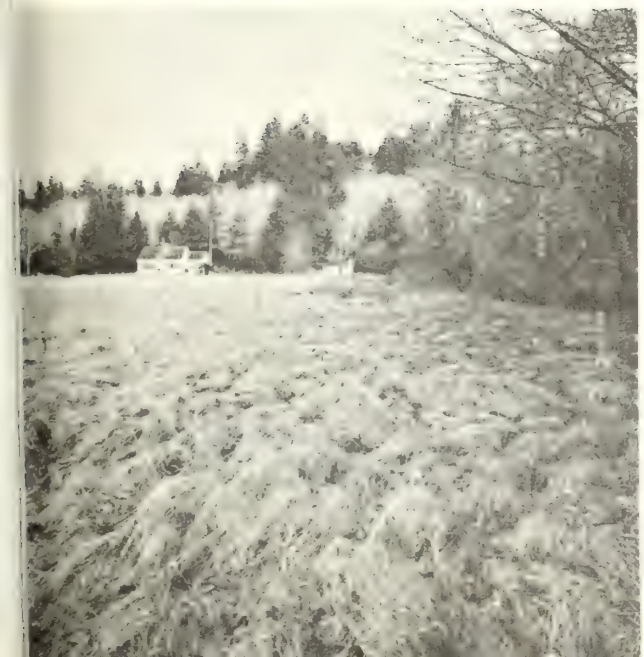

Figure 7.--Pasture and buildings at the headquarters site for Cascade Head Experimental Forest; the pasture is another locale of vagrant shrews, Townsend voles, and garter snakes and is a major feeding area for bats; bushy-tailed woodrats and some bats utilize the buildings area itself.

AMPHIBIANS

SALAMANDERS (ORDER CAUDATA)

Mole Salamanders (Family Ambystomatidae)

PACIFIC GIANT SALAMANDER (*Dicamptodon ensatus*): The Pacific giant salamander is the largest living land salamander in the world; large adults may attain lengths of 340 millimeters (13-1/2 inches). Adults of this species can be found during the day under logs, slabs of bark, large rocks, or other ground litter near the edges of streams, springs, and seepages. The larvae are aquatic. Although no adults were found in the Experimental Forest, about 30 larvae were observed under rocks in Deer Creek which constitutes an example of the Riparian Alder/Large Stream habitat. Two neotenic specimens (individuals which fail to metamorphose to adults but grow large and become sexually mature in the larval condition) were caught in a pool along Deer Creek in August 1972; a third neotene was recovered from the stomach of a great blue heron (*Ardea herodias*) which had been feeding in fairly slow, deep water along Deer Creek.

The Riparian Alder/Large Stream habitat supported the greatest numbers of larval Pacific giant salamanders; one larva was collected in a small stream (Riparian Alder/Small Stream).

OLYMPIC SALAMANDER (*Rhyacotriton olympicus*): The Olympic salamander is usually an inhabitant of the edges (splash zones) of relatively small, cold, swift, rocky streams. It can also frequently be found under moss-covered rocks of perennial springs and seepages. Along the Oregon coast, however, Olympic salamanders have occasionally been found in small, relatively slow-flowing, sandy-bottomed streams.

A single Olympic salamander was collected during a gentle rain along old Highway 101 in April 1971.

In March 1965, over 100 specimens were found during one afternoon along two small streams in the immediate vicinity of Hebo, Tillamook County, approximately 12 miles north of the northern boundary of Cascade Head Experimental Forest. Within the Experimental Forest, the species should be relatively abundant in the Riparian Alder/Large Stream habitat but uncommon in the Riparian Alder/Small Stream habitat.

Newts (Family Salamandridae)

ROUGH-SKINNED NEWT (*Taricha granulosa*): The rough-skinned newt is extremely common, almost ubiquitous, along the Oregon coast. During April 1971, rough-skinned newts were found wandering around in every habitat type except the Headland Prairie and the Pasture where they are likely to occur occasionally. The species spawns from late December to July (Stebbins 1954) and during this time would tend to be most abundant (as was the case in April 1971) in the Riparian Alder/Large Stream and Riparian Alder/Small Stream habitats.

Lungless Salamanders (Family Plethodontidae)

DUNN SALAMANDER (*Plethodon dunni*): The Dunn salamander is most common along coastal Oregon in piles of rock and rock slides which can be

Cascade Head Experimental Forest is a facility established by the U.S. Forest Service for research on the distinctive and very productive coastal "fogbelt" Sitka spruce (*Picea sitchensis*) and western hemlock (*Tsuga heterophylla*) forests of Oregon and Washington. Since its establishment in 1934, this 4,750-hectare (11,890-acre) tract has been jointly administered by the Pacific Northwest Forest and Range Experiment Station and Siuslaw National Forest as a site for basic biological research, experimentation in various forest management practices, and education. Accumulating information makes Cascade Head increasingly valuable as a resource for scientists and educators concerned with coastal forests.

Chris and Rita Maser spent 3 months (April 1971, August 1971, and August 1972) studying the fauna of the Experimental Forest as part of a larger study of the natural history of the entire Oregon coast. Data were collected on the abundance of various animals and their habitat preferences and food habits.

This checklist has been developed from those data plus some additional research on correlation of animal distributions with major plant communities. It is intended as a basis for further research on the fauna of the area and to provide other scientists and educators, as well as casual visitors, with information on the abundance and distribution of the vertebrates at Cascade Head. The lists of amphibians, reptiles, and mammals are considered reasonably complete; the bird list is only a partial checklist. Individuals wishing more information or identification are referred to appropriate field manuals (Peterson 1961, Burt and Grossenheider 1964, Stebbins 1966).[1/]

This report is in seven parts: (1) Introductory information on the physical features of Cascade Head Experimental Forest and its animal habitats; annotated checklists for the (2) amphibians, (3) reptiles, (4) birds, and (5) mammals; (6) a tabular listing of other animals which may be present on the Experimental Forest; and (7) a table showing the occurrence of animal species by habitat.

[1/] We used the following references for scientific names: (1) amphibians and reptiles--Stebbins 1954, 1966, (2) birds--American Ornithologists' Union 1957, and (3) mammals--Hall and Kelson 1959, Johnson and Ostenson 1959, Johnson 1968. Therefore, this report differs from the suggested field manuals in the use and spelling of some scientific names and in the use of some common names of mammals.

LOCATION AND PHYSICAL DESCRIPTION

Cascade Head Experimental Forest overlooks the Pacific Ocean immediately north of the Salmon River between Neskowin and Otis, Oregon (Madison 1957). The rectangular tract extends approximately 6 miles inland from the ocean and averages 3 miles north to south (fig. 1).

The actual acreage of the Experimental Forest available for research is about 3,290 hectares (8,220 acres) of which about 83 percent supports Sitka spruce-western hemlock forest with the remainder covered by red alder (*Alnus rubra*). Portions of the forest have been clearcut and other areas thinned or partially cut in connection with numerous studies of timber harvest practices, ecology, and management of individual tree species (Madison 1957). The Neskowin Crest Research Natural Area has also been set aside in perpetuity to protect an example of the coniferous forests in a completely undisturbed state (Franklin et al. 1972).

The Experimental Forest lies astride a major ridge extending from the Coast Ranges and jutting into the Pacific Ocean as a headland. Topography is irregular, with steep slopes and dissected drainages near the ocean and gentle to moderately steep slopes along the top of the main ridge and in the eastern third of the area. Elevations range from sea level to a maximum of 525 meters (1,750 feet). The top of the main ridge has a general elevational range of 225 to 305 meters (750 to 1,000 feet). The headland is a result of the underlying basalt bedrock, which is more resistant to erosion than the surrounding sedimentary formations. Sedimentary materials cap the basalt in most locations, however, and have served as the parent material for the fertile, moderately deep soils which are characteristic of the Experimental Forest.

The coastal climate is wet and mild. Precipitation averages 2,440 millimeters (96 inches) annually, most of which falls from October through March; summers are relatively dry with an average precipitation of only 76 millimeters (3 inches). Summers are cool with frequent fogs on the headland and few days with maxima over 27° C (80° F). Winters are mild with January temperatures averaging about 5° C (40° F).

PLANT COMMUNITIES

The Experimental Forest lies within the coastal *Picea sitchensis* Zone of Franklin and Dyrness (1973). The major plant formation is mature coniferous forest composed of western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*), and Douglas-fir (*Pseudotsuga menziesii*) (fig. 2). These forest stands apparently originated after a major wildfire about 1850. They are generally dense and highly productive with dominant trees averaging 60 to 100 centimeters (25 to 40 inches) in diameter at breast height and 50 to 70 meters (150 to 210 feet) in height. Stand composition varies depending on the distance from the Pacific Ocean. The percentage of Sitka spruce is highest close to the ocean and declines in the eastern third of the Experimental Forest; conversely, Douglas-fir is rare close to the ocean and is common only in the eastern third.

Most of these mature stands have understories characteristic of the *Tsuga heterophylla/Polystichum munitum-Oxalis oregana* association which is considered to be the climax over much of this area. Development of

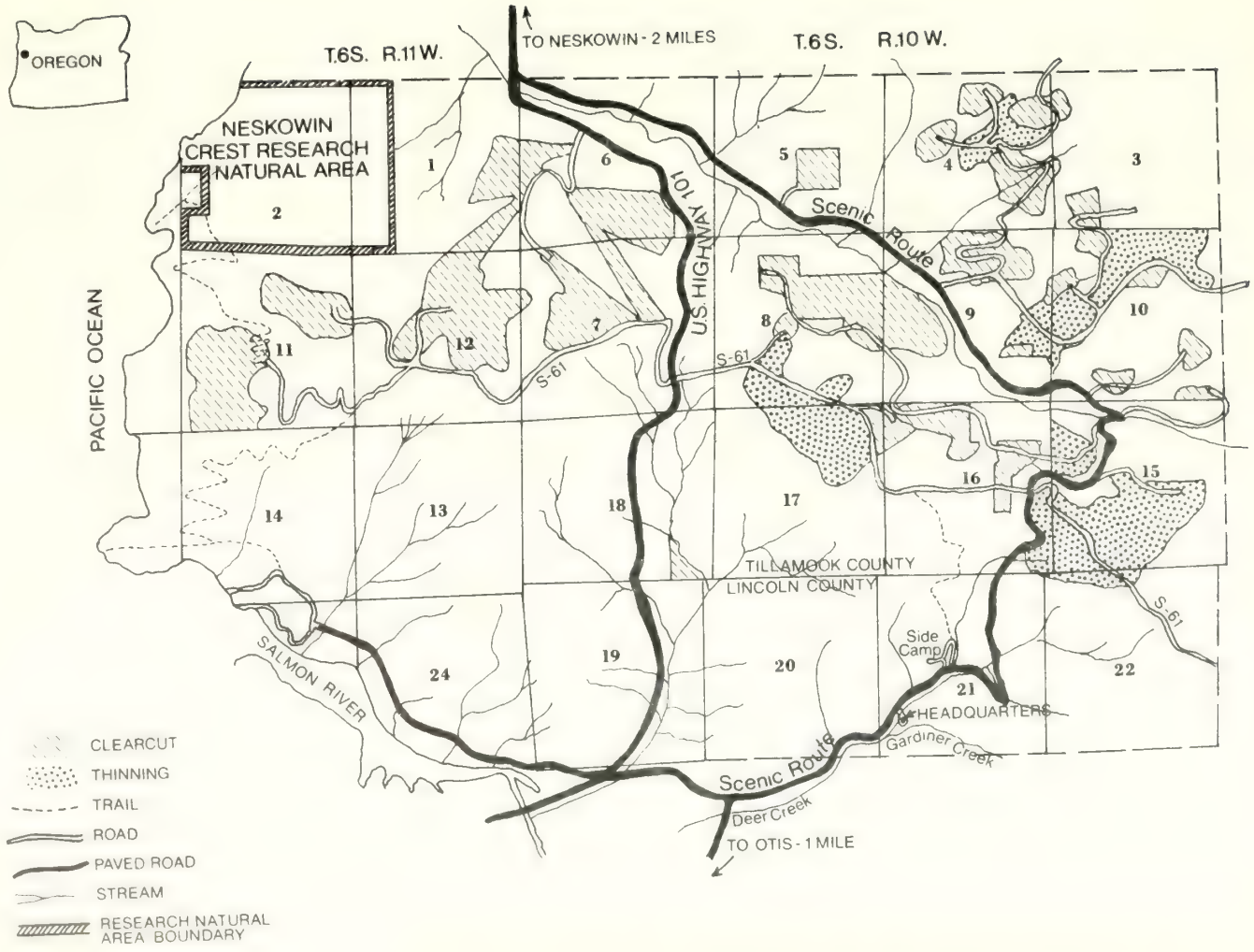

Figure 1.--Map of Cascade Head Experimental Forest showing roads and the major locations referred to in the checklist.

Figure 2.--Dense, 120-year-old stands of Sitka spruce and western hemlock (Mature Conifer) are the major forest cover on the Cascade Head Experimental Forest; red tree voles and flying squirrels inhabit such forests.

the shrub layer varies with overstory density, and in the densest stands shrubs are virtually absent except for scattered red huckleberry (*Vaccinium parvifolium*). In stands close to the coast (see Neskowin Crest Research Natural Area in Franklin et al. 1972) rustyleaf (*Menziesia ferruginea*) is the most common shrub. Devilsclub (*Oplopanax horridum*) is found in some wetter microsites, and in wet areas with relatively open canopies salmonberry (*Rubus spectabilis*) may form thickets. Herb layers are usually well developed in the mature forests and are characterized by swordfern (*Polystichum munitum*), Oregon oxalis (*Oxalis oregana*), false lily-of-the-valley (*Maianthemum dilatatum*), and the coolworts (*Tiarella trifoliata* and *T. unifoliata*). On moister microsites, several additional species are found such as ladyfern (*Athyrium filix-femina*) and deerfern (*Blechnum spicant*). A prominent ground cover of moss, dominantly *Eurhynchium oreganum*, is present. In the animal annotations we will refer to this community as the "Mature Conifer."

There are also substantial acreages of dense young coniferous forest which are a result of planting and natural seeding during the last 10 to 40 years (fig. 3). A mixture of Sitka spruce, western hemlock, and Douglas-fir is typical, sometimes with interspersed red alder. These stands grow very rapidly (Fujimori 1971); once the canopy closes, most of the understory is eliminated, leaving a forest floor which is nearly barren or partially covered by a carpet of moss along with scattered herbs. Dead branches on the boles may extend nearly to the ground. We will refer to this habitat as "Immature Conifer" in the annotations.

Figure 3.--Young, very dense conifer stands (Immature Conifer) have almost no understory and dead branches may extend nearly to ground level; red-backed voles are frequently found in such areas.

The mature red alder or mixed red alder-conifer communities are the second most abundant (fig. 4).[2/] With rare exception, these are seral or pioneer communities which are approaching maturity (based on senescence of the overstory red alder) despite their relatively young range of ages (35 to 50 years). Red alder is the most common dominant tree species with most 15 to 20 meters (45 to 60 feet) in height and 20 to 30 centimeters (8 to 12 inches) in diameter at breast height. Varying percentages of conifers may be present. Sitka spruce can be an associate in the overstory canopy or present as suppressed seedlings and saplings in the understory. Douglas-fir, if present, is usually a dominant, with its canopy above that of the red alder dominants. A dense shrubby understory of salmonberry is typical in these mature stands along with varying amounts of red elderberry (*Sambucus racemosa* var. *arborescens*). Vine maple (*Acer circinatum*) and thimbleberry (*Rubus parviflorus*) may also be present. The herbaceous layer is usually well represented, with swordfern, false lily-of-the-valley, and western springbeauty (*Montia sibirica*) most characteristic. The moss layer is generally poorly represented. Henderson[3/] has described a general sequence in understory development of red alder stands which begins primarily with herbs and culminates with dominance by salmonberry;

[2/] We include the mixed stands here because in overall composition and physiognomy and in terms of animal habitats they more nearly resemble alder than conifer stands (see, e.g., Franklin and Pechanec 1968 and Berntsen 1961).

[3/] Jan Alan Henderson. Biomass and composition of the understory vegetation in some *Alnus rubra* stands in western Oregon. M.S. thesis on file at Oregon State University, Corvallis, 64 p., 1970.

Figure 4.--Red alder or mixed alder-conifer stands (Alder/Salmonberry) often have dense understories of salmonberry; these communities provide habitat for the greatest variety of animals.

most of the Cascade Head stands appear to fall into the mature (later) stage of development. We will refer to this habitat as "Alder/Salmonberry" in the annotations.

A phase of this community usually dominates the edges of perennial streams. Streams provide some animal habitats not found in the more typical upland form of the habitat even though it is sometimes difficult to identify differences in the plants. Furthermore, the animals vary, depending upon the size of the stream. "Riparian Alder/Large Stream" will be used to denote habitat with larger streams which typically have stonier streambeds and broader, more frequently disturbed flood plains. "Riparian Alder/Small Stream" identifies habitats with permanent but small streams which are usually characterized by sandy or gravelly streambeds and minor flood plains.

Several other plant communities of minor extent are particularly important as habitats for animals not found elsewhere. Skunkcabbage (*Lysichitum americanum*) swales or marshes have standing, and often stagnant, water for at least part of the year (fig. 5). They are generally very small in area but have a distinctive herbaceous flora. We will refer to these areas as "Skunkcabbage Marsh" in the annotations. An oceanside headland prairie or herbland exists at the west end of Cascade Head (fig. 6). Its varied composition has been described by Davidson.[4/] We will refer to this habitat as "Headland Prairie." A pasture has been maintained at the headquarters site for more than 40 years (fig. 7); we will refer to this habitat as "Pasture."

[4/] Eric Duncan Davidson. Synecological features of a natural headland prairie in the Oregon coast. M.S. thesis on file at Oregon State University, Corvallis, 79 p., 1967.

Figure 5.--Marshy areas characterized by skunkcabbage (Skunkcabbage Marsh) are found in wet, poorly drained sites; red-legged frogs and marsh shrews are found in this habitat.

Figure 6.--An oceanside prairie or herbland (Headland Prairie) is found at the end of Cascade Head; red-tailed hawks hunt vagrant shrews and Townsend voles in this area.

Figure 7.--Pasture and buildings at the headquarters site for Cascade Head Experimental Forest; the pasture is another locale of vagrant shrews, Townsend voles, and garter snakes and is a major feeding area for bats; bushy-tailed woodrats and some bats utilize the buildings area itself.

AMPHIBIANS

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DUNN SALAMANDER (*Plethodon dunni*): The Dunn salamander is most common along coastal Oregon in piles of rock and rock slides which can be

Table 1.--*Vertebrates not encountered during the 1971-72 study, but which may or should be part of the fauna of Cascade Head Experimental Forest*

AMPHIBIANS

Salamanders (Order Caudata)
- Mole salamanders (Family Ambystomatidae)
  - Northwestern salamander (*Ambystoma gracile*)

REPTILES

Lizards (Order Squamata)
- Alligator lizard (Family Anguidae)
  - Northern alligator lizard (*Gerrhonotus coeruleus*)

BIRDS

Ducks (Order Anseriformes)
- Ducks (Family Anatidae)
  - American merganser (*Mergus merganser*)

Hawks and Vultures (Order Falconiformes)
- Vultures (Family Cathartidae)
  - Turkey vulture (*Cathartes aura*)
- Hawks and Eagles (Family Accipitridae)
  - Goshawk (*Accipiter gentilis*)
  - Sharp-shinned hawk (*Accipiter striatus*)
  - Golden eagle (*Aquila chrysaetos*)
  - Bald eagle (*Haliaeetus leucocephalus*)
- Falcons (Family Falconidae)
  - Peregrine falcon (*Falco peregrinus*)
  - Merlin (*Falco columbarius*)
  - Sparrow hawk (*Falco sparverius*)

Grouse and Quail (Order Galliformes)
- Grouse (Family tetraonidae)
  - Blue grouse (*Dendragapus obscurus*)
- Quail (Family Phasianidae)
  - Mountain quail (*Oreortyx pictus*)

Owls (Order Strigiformes)
- Typical Owls (Family Strigidae)
  - Spotted owl (*Strix occidentalis*)
  - Short-eared owl (*Asio flammeus*)
  - Saw-whet owl (*Aegolius acadicus*)

Goatsuckers (Order Caprimulgiformes)
- Goatsuckers (Family Caprimulgidae)
  - Common nighthawk (*Chordeiles minor*)

Table 1.--*Vertebrates not encountered during the 1971-72 study, but which may or should be part of the fauna of Cascade Head Experimental Forest* (continued)

BIRDS (continued)

Swifts (Order Micropodiformes)
- Swifts (Family Apodidae)
  - Black swift (*Cypseloides niger*)
  - Vaux's swift (*Chaetura vauxi*)

Woodpeckers (Order Piciformes)
- Woodpeckers (Family Picidae)
  - Downy woodpecker (*Dendrocopos pubescens*)

Perching Birds (Order Passeriformes)
- Flycatchers (Family Tyrannidae)
  - Traill's flycatcher (*Empidonax traillii*)
  - Hammond's flycatcher (*Empidonax hammondii*)
  - Western flycatcher (*Empidonax difficilis*)
  - Western wood pewee (*Contopus sordidulus*)
  - Olive-sided flycatcher (*Nuttallornis borealis*)
- Swallows (Family Hirundinidae)
  - Tree swallow (*Iridoprocne bicolor*)
- Crows (Family Corvidae)
  - Common crow (*Corvus brachyrhynchos*)
- Bushtits (Family Paridae)
  - Common bushtit (*Psaltriparus minimus*)
- Nuthatches (Family Sittidae)
  - Red-breasted nuthatch (*Sitta canadensis*)
- Solitaires (Family Turdidae)
  - Townsend's solitaire (*Myadestes townsendi*)
- Waxwings (Family Bombycillidae)
  - Bohemian waxwing (*Bombycilla garrula*)
- Vireos (Family Vireonidae)
  - Hutton's vireo (*Vireo huttoni*)
  - Solitary vireo (*Vireo solitarius*)
- Wood Warblers (Family Parulidae)
  - Orange-crowned warbler (*Vermivora celata*)
  - Myrtle warbler (*Dendroica coronata*)
  - Audubon's warbler (*Dendroica auduboni*)
  - Townsend's warbler (*Dendroica townsendi*)
  - Hermit warbler (*Dendroica occidentalis*)
  - MacGillivray's warbler (*Oporornis tolmiei*)
  - Wilson's warbler (*Wilsonia pusilla*)
- Tanagers (Family Thraupidae)
  - Western tanager (*Piranga ludoviciana*)
- Grosbeaks, Finches, and Sparrows (Family Fringillidae)
  - Black-headed grosbeak (*Pheucticus melanocephalus*)
  - Evening grosbeak (*Hesperiphona vespertina*)

Table 1.--*Vertebrates not encountered during the 1971-72 study, but which may or should be part of the fauna of Cascade Head Experimental Forest* (continued)

BIRDS (continued)

Grosbeaks, Finches, and Sparrows (continued)
- Purple finch (*Carpodacus purpureus*)
- House finch (*Carpodacus mexicanus*)
- Pine siskin (*Spinus pinus*)
- American goldfinch (*Spinus tristis*)
- Red crossbill (*Loxia curvirostra*)
- Rufous-sided towhee (*Pipilo erythrophthalmus*)
- Savannah sparrow (*Passerculus sandwichensis*)
- Golden-crowned sparrow (*Zonotrichia atricapilla*)
- Fox sparrow (*Passerella iliaca*)

MAMMALS

Bats (Order Chiroptera)
- Evening Bats (Family Vespertilionidae)
  - Western big-eared bat (*Plecotus townsendi*)

Rabbits (Order Lagomorpha)
- Rabbits (Family Leporidae)
  - Brush rabbit (*Sylvilagus bachmani*)

Flesh Eaters (Order Carnivora)
- Fox (Family Canidae)
  - Gray fox (*Urocyon cinereoargenteus*)
- Bear (Family Ursidae)
  - Black bear (*Ursus americanus*)
- Marten and Weasel (Family Mustelidae)
  - Marten (*Martes americana*)
  - Short-tailed weasel (*Mustela erminea*)
  - Striped skunk (*Mephitis mephitis*)
- Cats (Family Felidae)
  - Mountain lion (*Felis concolor*)

Table 2.--*Known distribution of vertebrates in the Cascade Head Experimental Forest by habitats*

Vertebrate	Mature Conifer	Immature Conifer	Alder/Salmonberry	Riparian Alder/ Small Stream	Riparian Alder/ Large Stream	Skunkcabbage Marsh	Headland Prairie	Pasture
AMPHIBIANS								
Pacific giant salamander				X	X			
Olympic salamander					X			
Rough-skinned newt	X	X	X	X	X	X		
Dunn salamander		X						
Western red-backed salamander	X	X	X					
Oregon salamander		X						
Tailed frog				X	X			
Pacific tree frog	X	X	X	X	X	X	X	X
Red-legged frog			X	X	X	X		
REPTILES								
Northwestern garter snake				X	X	X	X	X
Common garter snake				X	X			X
BIRDS								
Great blue heron					X			
Cooper's hawk								X
Red-tailed hawk							X	
Ruffed grouse			X					
Band-tailed pigeon				X				
Mourning dove		X	X					
Screech owl		X	X	X				
Great horned owl	X						X	X
Pygmy owl		X	X					
Rufous Hummingbird	X	X	X	X	X	X	X	X
Belted Kingfisher				X	X			
Red-shafted flicker	X	X						X
Pileated woodpecker	X	X						
Red-breasted sapsucker			X					
Hairy woodpecker	X		X					
Violet-green swallow							X	X
Gray jay	X							
Steller's jay	X	X	X	X	X	X	X	X
Common raven	X						X	X
Chestnut-backed chickadee	X	X	X	X	X	X		
Brown creeper	X	X						
Wrentit							X	

Table 2.--*Known distribution of vertebrates in the Cascade Head Experimental Forest by habitats* (continued)

Vertebrate	Mature Conifer	Immature Conifer	Alder/Salmonberry	Riparian Alder/ Small Stream	Riparian Alder/ Large Stream	Skunkcabbage Marsh	Headland Prairie	Pasture
BIRDS (continued)								
Dipper					X			
Winter wren	X	X	X	X	X	X		
Robin							X	X
Varied thrush	X	X	X	X	X	X		
Hermit thrush			X					
Swainson's thrush			X					
Golden-crowned kinglet	X							
Ruby-crowned kinglet	X							
Cedar waxwing								X
Oregon junco	X	X	X	X	X	X		
Chipping sparrow								X
White-crowned sparrow								X
Song sparrow			X	X	X	X	X	X
MAMMALS								
Vagrant or wandering shrew							X	X
Yaquina shrew			X	X	X	X		
Marsh shrew				X		X		
Trowbridge shrew	X	X	X	X	X	X		
Shrew-mole	X	X	X	X	X	X		
Townsend mole								X
Coast mole	X	X	X	X	X	X	X	X
Little brown bat			X					X
Yuma bat								X
Long-eared bat								X
Fringed bat								X
Long-legged bat			X					
California bat								X
Silver-haired bat			X					
Big brown bat			X					X
Hoary bat								X
Snowshoe hare	X	X	X	X	X	X		
Mountain beaver	X	X	X	X	X	X		
Townsend chipmunk	X	X	X	X	X	X		
California ground squirrel			X					
Chickaree	X	X						
Northern flying squirrel		X						
Beaver					X			

Table 2.--*Known distribution of vertebrates in the Cascade Head Experimental Forest by habitats* (continued)

Vertebrate	Mature Conifer	Immature Conifer	Alder/Salmonberry	Riparian Alder/ Small Stream	Riparian Alder/ Large Stream	Skunkcabbage Marsh	Headland Prairie	Pasture
MAMMALS (continued)								
Deer mouse	X	X	X	X	X	X	X	X
Bushy-tailed woodrat	X	X	X	X	X	X		
California red-backed vole	X	X						
White-footed vole				X				
Red tree vole	X	X						
Townsend vole							X	X
Long-tailed vole				X				
Oregon vole	X	X						
Pacific jumping mouse			X	X	X			
Coyote	X							
Bobcat	X	X	X	X	X	X	X	X
Raccoon					X			
Long-tailed weasel	X	X	X	X	X	X		
Mink			X		X			
Spotted skunk	X	X	X	X	X	X	X	X
River otter					X			
Mule deer	X	X	X	X	X	X	X	X

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Table 1.--*Vertebrates not encountered during the 1971-72 study, but which may or should be part of the fauna of Cascade Head Experimental Forest*

AMPHIBIANS

Salamanders (Order Caudata)
- Mole salamanders (Family Ambystomatidae)
  - Northwestern salamander (*Ambystoma gracile*)

REPTILES

Lizards (Order Squamata)
- Alligator lizard (Family Anguidae)
  - Northern alligator lizard (*Gerrhonotus coeruleus*)

BIRDS

Ducks (Order Anseriformes)
- Ducks (Family Anatidae)
  - American merganser (*Mergus merganser*)

Hawks and Vultures (Order Falconiformes)
- Vultures (Family Cathartidae)
  - Turkey vulture (*Cathartes aura*)
- Hawks and Eagles (Family Accipitridae)
  - Goshawk (*Accipiter gentilis*)
  - Sharp-shinned hawk (*Accipiter striatus*)
  - Golden eagle (*Aquila chrysaetos*)
  - Bald eagle (*Haliaeetus leucocephalus*)
- Falcons (Family Falconidae)
  - Peregrine falcon (*Falco peregrinus*)
  - Merlin (*Falco columbarius*)
  - Sparrow hawk (*Falco sparverius*)

Grouse and Quail (Order Galliformes)
- Grouse (Family tetraonidae)
  - Blue grouse (*Dendragapus obscurus*)
- Quail (Family Phasianidae)
  - Mountain quail (*Oreortyx pictus*)

Owls (Order Strigiformes)
- Typical Owls (Family Strigidae)
  - Spotted owl (*Strix occidentalis*)
  - Short-eared owl (*Asio flammeus*)
  - Saw-whet owl (*Aegolius acadicus*)

Goatsuckers (Order Caprimulgiformes)
- Goatsuckers (Family Caprimulgidae)
  - Common nighthawk (*Chordeiles minor*)

Table 1.--*Vertebrates not encountered during the 1971-72 study, but which may or should be part of the fauna of Cascade Head Experimental Forest* (continued)

BIRDS (continued)

Swifts (Order Micropodiformes)
- Swifts (Family Apodidae)
  - Black swift (*Cypseloides niger*)
  - Vaux's swift (*Chaetura vauxi*)

Woodpeckers (Order Piciformes)
- Woodpeckers (Family Picidae)
  - Downy woodpecker (*Dendrocopos pubescens*)

Perching Birds (Order Passeriformes)
- Flycatchers (Family Tyrannidae)
  - Traill's flycatcher (*Empidonax traillii*)
  - Hammond's flycatcher (*Empidonax hammondii*)
  - Western flycatcher (*Empidonax difficilis*)
  - Western wood pewee (*Contopus sordidulus*)
  - Olive-sided flycatcher (*Nuttallornis borealis*)
- Swallows (Family Hirundinidae)
  - Tree swallow (*Iridoprocne bicolor*)
- Crows (Family Corvidae)
  - Common crow (*Corvus brachyrhynchos*)
- Bushtits (Family Paridae)
  - Common bushtit (*Psaltriparus minimus*)
- Nuthatches (Family Sittidae)
  - Red-breasted nuthatch (*Sitta canadensis*)
- Solitaires (Family Turdidae)
  - Townsend's solitaire (*Myadestes townsendi*)
- Waxwings (Family Bombycillidae)
  - Bohemian waxwing (*Bombycilla garrula*)
- Vireos (Family Vireonidae)
  - Hutton's vireo (*Vireo huttoni*)
  - Solitary vireo (*Vireo solitarius*)
- Wood Warblers (Family Parulidae)
  - Orange-crowned warbler (*Vermivora celata*)
  - Myrtle warbler (*Dendroica coronata*)
  - Audubon's warbler (*Dendroica auduboni*)
  - Townsend's warbler (*Dendroica townsendi*)
  - Hermit warbler (*Dendroica occidentalis*)
  - MacGillivray's warbler (*Oporornis tolmiei*)
  - Wilson's warbler (*Wilsonia pusilla*)
- Tanagers (Family Thraupidae)
  - Western tanager (*Piranga ludoviciana*)
- Grosbeaks, Finches, and Sparrows (Family Fringillidae)
  - Black-headed grosbeak (*Pheucticus melanocephalus*)
  - Evening grosbeak (*Hesperiphona vespertina*)

Table 1.--*Vertebrates not encountered during the 1971-72 study, but which may or should be part of the fauna of Cascade Head Experimental Forest* (continued)

BIRDS (continued)

- Grosbeaks, Finches, and Sparrows (continued)
  - Purple finch (*Carpodacus purpureus*)
  - House finch (*Carpodacus mexicanus*)
  - Pine siskin (*Spinus pinus*)
  - American goldfinch (*Spinus tristis*)
  - Red crossbill (*Loxia curvirostra*)
  - Rufous-sided towhee (*Pipilo erythrophthalmus*)
  - Savannah sparrow (*Passerculus sandwichensis*)
  - Golden-crowned sparrow (*Zonotrichia atricapilla*)
  - Fox sparrow (*Passerella iliaca*)

MAMMALS

- Bats (Order Chiroptera)
  - Evening Bats (Family Vespertilionidae)
    - Western big-eared bat (*Plecotus townsendi*)
- Rabbits (Order Lagomorpha)
  - Rabbits (Family Leporidae)
    - Brush rabbit (*Sylvilagus bachmani*)
- Flesh Eaters (Order Carnivora)
  - Fox (Family Canidae)
    - Gray fox (*Urocyon cinereoargenteus*)
  - Bear (Family Ursidae)
    - Black bear (*Ursus americanus*)
  - Marten and Weasel (Family Mustelidae)
    - Marten (*Martes americana*)
    - Short-tailed weasel (*Mustela erminea*)
    - Striped skunk (*Mephitis mephitis*)
  - Cats (Family Felidae)
    - Mountain lion (*Felis concolor*)

Table 2.--*Known distribution of vertebrates in the Cascade Head Experimental Forest by habitats*

Vertebrate	Mature Conifer	Immature Conifer	Alder/Salmonberry	Riparian Alder/ Small Stream	Riparian Alder/ Large Stream	Skunkcabbage Marsh	Headland Prairie	Pasture
AMPHIBIANS								
Pacific giant salamander				X	X			
Olympic salamander					X			
Rough-skinned newt	X	X	X	X	X	X		
Dunn salamander		X						
Western red-backed salamander	X	X	X					
Oregon salamander		X						
Tailed frog				X	X			
Pacific tree frog	X	X	X	X	X	X	X	X
Red-legged frog			X	X	X	X		
REPTILES								
Northwestern garter snake				X	X	X	X	X
Common garter snake				X	X			X
BIRDS								
Great blue heron					X			
Cooper's hawk								X
Red-tailed hawk							X	
Ruffed grouse			X					
Band-tailed pigeon				X				
Mourning dove		X	X					
Screech owl		X	X	X				
Great horned owl	X						X	X
Pygmy owl		X	X					
Rufous Hummingbird	X	X	X	X	X	X	X	X
Belted Kingfisher				X	X			
Red-shafted flicker	X	X						X
Pileated woodpecker	X	X						
Red-breasted sapsucker			X					
Hairy woodpecker	X		X					
Violet-green swallow							X	X
Gray jay	X							
Steller's jay	X	X	X	X	X	X	X	X
Common raven	X						X	X
Chestnut-backed chickadee	X	X	X	X	X	X		
Brown creeper	X	X						
Wrentit							X	

Table 2.--*Known distribution of vertebrates in the Cascade Head Experimental Forest by habitats* (continued)

Vertebrate	Mature Conifer	Immature Conifer	Alder/Salmonberry	Riparian Alder/ Small Stream	Riparian Alder/ Large Stream	Skunkcabbage Marsh	Headland Prairie	Pasture
BIRDS (continued)								
Dipper					X			
Winter wren	X	X	X	X	X	X		
Robin							X	X
Varied thrush	X	X	X	X	X	X		
Hermit thrush			X					
Swainson's thrush			X					
Golden-crowned kinglet	X							
Ruby-crowned kinglet	X							
Cedar waxwing								X
Oregon junco	X	X	X	X	X	X		
Chipping sparrow								X
White-crowned sparrow								X
Song sparrow			X	X	X	X	X	X
MAMMALS								
Vagrant or wandering shrew							X	X
Yaquina shrew			X	X	X	X		
Marsh shrew				X		X		
Trowbridge shrew	X	X	X	X	X	X		
Shrew-mole	X	X	X	X	X	X		
Townsend mole								X
Coast mole	X	X	X	X	X	X	X	X
Little brown bat			X					X
Yuma bat								X
Long-eared bat								X
Fringed bat								X
Long-legged bat			X					
California bat								X
Silver-haired bat			X					
Big brown bat			X					X
Hoary bat								X
Snowshoe hare	X	X	X	X	X	X		
Mountain beaver	X	X	X	X	X	X		
Townsend chipmunk	X	X	X	X	X	X		
California ground squirrel			X					
Chickaree	X	X						
Northern flying squirrel		X						
Beaver					X			

Table 2.--*Known distribution of vertebrates in the Cascade Head Experimental Forest by habitats* (continued)

Vertebrate	Mature Conifer	Immature Conifer	Alder/Salmonberry	Riparian Alder/ Small Stream	Riparian Alder/ Large Stream	Skunkcabbage Marsh	Headland Prairie	Pasture
MAMMALS (continued)								
Deer mouse	X	X	X	X	X	X	X	X
Bushy-tailed woodrat	X	X	X	X	X	X		
California red-backed vole	X	X						
White-footed vole				X				
Red tree vole	X	X						
Townsend vole							X	X
Long-tailed vole				X				
Oregon vole	X	X						
Pacific jumping mouse			X	X	X			
Coyote	X							
Bobcat	X	X	X	X	X	X	X	X
Raccoon					X			
Long-tailed weasel	X	X	X	X	X	X		
Mink			X		X			
Spotted skunk	X	X	X	X	X	X	X	X
River otter					X			
Mule deer	X	X	X	X	X	X	X	X

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This annotated checklist includes 9 amphibians, 2 reptiles, 35 birds, and 40 mammals. A standardized animal habitat classification is presented in an effort to correlate the vertebrates in some meaningful way to their environment.

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The mission of the PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION is to provide the knowledge, technology, and alternatives for present and future protection, management, and use of forest, range, and related environments.

Within this overall mission, the Station conducts and stimulates research to facilitate and to accelerate progress toward the following goals:

1. Providing safe and efficient technology for inventory, protection, and use of resources.
2. Development and evaluation of alternative methods and levels of resource management.
3. Achievement of optimum sustained resource productivity consistent with maintaining a high quality forest environment.

The area of research encompasses Oregon, Washington, Alaska, and, in some cases, California, Hawaii, the Western States, and the Nation. Results of the research will be made available promptly. Project headquarters are at:

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The FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives – as directed by Congress – to provide increasingly greater service to a growing Nation.

1974
USDA Forest Service Resource Bulletin PNW-52

CALIFORNIA FOREST INDUSTRY

Wood Consumption and Characteristics, 1972

James O. Howard

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PORTLAND, OREGON

HIGHLIGHTS

Industry Characteristics

- Total number of mills was 238:

Type of mill	Number	Capacity
Sawmills	176	16.6 MMBF (8-hour shift)
Veneer and plywood	25	4.0 MMSF (8-hour shift)
Pulp	9	2,600 tons (daily)
Board	9	1.7 MMSF (3/4-inch basis) (daily)
Log export	6	--
Shake and shingle	7	212 squares (8-hour shift)
Post, pole, and piling	6	58.3 MMBF (annually)

- Humboldt, with 54 mills, was the leading county in number of mills.

- The 52 largest sawmills had 54 percent of the total sawmill capacity.

Wood Consumption

- 5.45 billion board feet of roundwood (logs) were consumed.

- 28 million board feet of peeler cores, cants, blocks, bolts, and miscellaneous peeled products were consumed.

- 2.3 million bone-dry tons of chips, shavings, sawdust, and bark were consumed by the pulp and board industry.

- Leading counties in roundwood use were:

	Million board feet
Humboldt	1,221
Siskiyou	548
Mendocino	510
Shasta	432

- Roundwood use by industry:

	Percent
Sawmills	86.1
Veneer and plywood	11.8
Log export	1.4
Pulp and board	.1
Post, pole, and piling	.2
Shake and shingle	.1

- Roundwood accounted for only 2 percent of wood use by pulp and board industry.

- 72 percent of all logs were old growth.

- 94 percent of all logs were sound.

- 27 percent of all logs were Douglas-fir; 25 percent ponderosa and sugar pines; 22 percent true firs; and 19 percent redwood.

- 41 percent of all logs came from National Forests; 39 percent from forest industry lands; 17 percent from miscellaneous private lands; and 3 percent from other public land.

Mill Residues

- 7.7 million tons of wood and bark residue were generated:

Type of mill	Thousand tons
Sawmill	6,830
Veneer and plywood	851
Shake and shingle	2

- 77 percent of all residue was wood; 23 percent was bark.

- 81 percent of wood residue and 50 percent of bark were used.

- 51 percent of wood residue went to the pulp and board industry; 23 percent for fuel; 7 percent miscellaneous; and 19 percent unused.

- 25 percent of bark residue was used as fuel; 25 percent miscellaneous; and 50 percent unused.

FOREWORD

This report presents the results of a survey of the primary wood processing industry in California for 1972. This survey identifies the raw material inputs, both logs and mill residues, and the characteristics of the forest products industries. Data are shown separately for the following industries: lumber, veneer and plywood, pulp and board, shake and shingle, post, pole, and piling, and export.

Surveys of the wood use by the California forest industries were conducted by the Pacific Southwest Forest and Range Experiment Station in 1946, 1951, 1956, and 1962. In 1968, a survey similar to the present one was conducted jointly by the California Division of Forestry and the Pacific Northwest Forest and Range Experiment Station. The earlier surveys differ principally from the 1968 and 1972 surveys in that they did not include information about the processing facilities.

Data for 1972 were obtained from a 100-percent mail and telephone canvass of all primary processors of wood conducted during 1973. Industry contacts for the 1972 survey were based on a mill list from the 1968 survey, updated with the assistance of the California Division of Forestry.

As the survey represents a 100-percent canvass, no sampling error is involved. The information collected from each mill is assumed to be the most reliable and best available. Where possible, the data came from records; in some instances, however, estimates were made by mill officials. Information for individual mills is strictly confidential; information that could reveal critical detail of individual operations has been combined with other data to avoid disclosure.

In the tables, "--" indicates the value is either "0" or not available.

ACKNOWLEDGMENTS

Grateful thanks are given to the mill owners and operators who gave freely of their time in order to provide the data for this report, and to the major forest industry associations for their support of this study. Special acknowledgment is made of the following for their assistance:

- Division of State and Private Forestry, U.S. Forest Service, Region 5, for their interest and financial assistance in making this survey possible.
- State of California, Division of Forestry, for assistance in in updating the mill list, and sharing their knowledge of the forest industries of California.
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THE FOREST INDUSTRY IN PERSPECTIVE

The California forest industry[1] as it exists today is the product of dramatic post-World War II changes. Before World War II, the industry consisted almost entirely of sawmills, depending primarily upon redwood and pines for their raw material supply. Responding to the post-War building boom and local population growth, the sawmill industry increased rapidly--from 450 to almost 1,000 mills during 1945-48.

Before 1947, there was no significant plywood production in California. However, from 1947 the industry increased production from 20 million square feet (3/8-inch basis) to a peak of 1,305 million square feet in 1964 (fig. 1). Up to 1964, the industry relied almost entirely on Douglas-fir for its raw material supply.

A large share of the Douglas-fir timber was located on the small private holdings in the North Coast area. However, by the midfifties, much of this land had been cut over, and the sawmill and plywood industries were faced with increased competition for a declining resource. Following a peak in 1959, lumber production declined, due to reduced availability of Douglas-fir. Although the plywood industry was able to outbid the sawmill sector for raw material, the effect of a continuing decline in Douglas-fir supplies was felt into the midsixties.

Major pulp production in California began in 1948 with the construction of a mill in the San Francisco area. Construction of a hardboard plant in 1951 marked the first board production in the State. Relying almost entirely on residues from the sawmill and plywood industries, the pulp and board industry has grown steadily. In 1972, California produced about 700,000 tons of wood pulp.

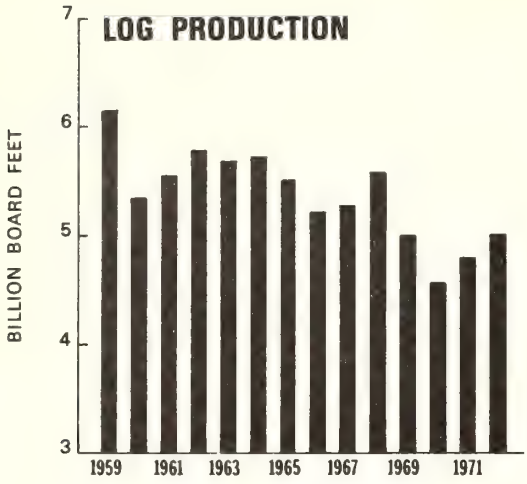
Recent trends in the California forest industry have been toward fewer but larger sawmills, increasing production in the board industry, and more complex processing operations. A major result of these changes is a degree of diversification in the forest industry not found before World War II. However, the industry is still dominated by the sawmill sector (fig. 2).

California is a major producer of many wood products. In 1972, California produced 5.6 billion board feet of lumber, 15 percent of the Nation's total.[2] However, about 18 percent of the Nation's softwood lumber comes from the State. California ranks third nationally in plywood production, with just less than 6 percent of the total. In 1972 California produced about 2 percent of the Nation's total wood pulp. Particleboard and hardboard production for that year were about 8 percent and 6 percent, respectively, of the Nation's totals. The 1972 log harvest of 5.0 billion board feet was 8 percent of the Nation's total. In 1968, California accounted for almost 10 percent of the logs exported from the Western States; in 1972, this figure dropped to 3 percent. This is partially due to the dropoff in redwood exports and foreign demand, but also the relative increase in exports from Oregon and Washington.

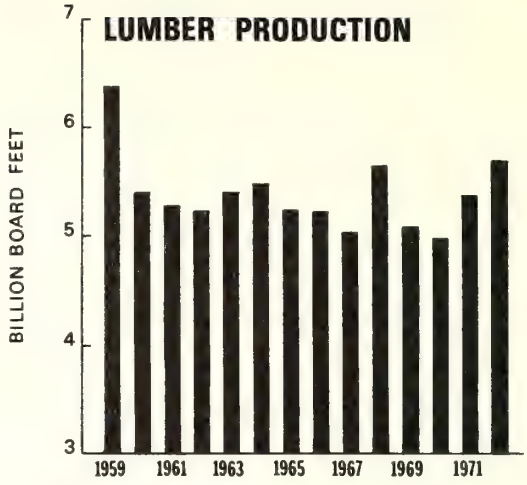
---

[1] Comprised of the lumber and wood products and paper and allied products industries; also referred to as the "forest products industries" or the "timber industries." The term "mill" is used for all types of primary processing plants, although it is recognized that some are better described by other terms, such as export operations or facilities and pole and piling yards.

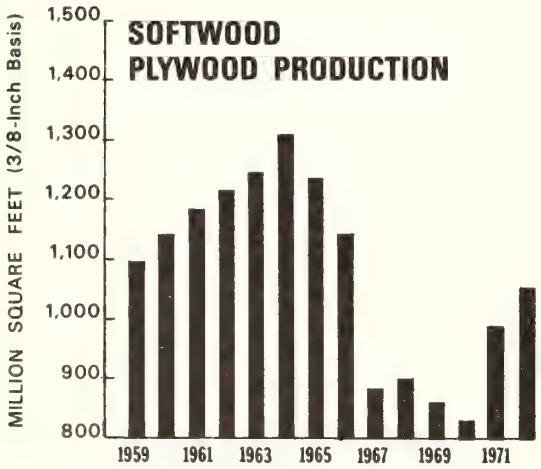
[2] Western Wood Products Association. 1972 Statistical Yearbook. 1973.



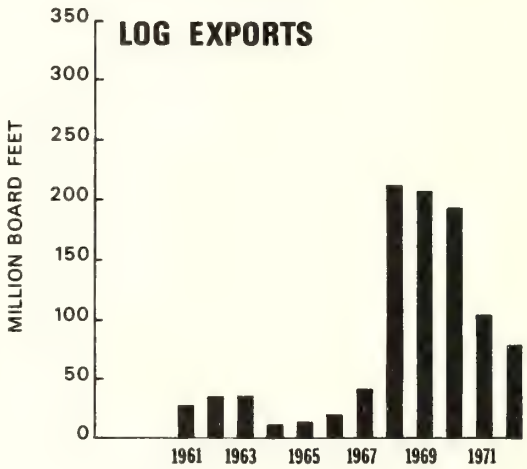
SOURCE: California Division of Forestry



SOURCE: Bureau of Census



SOURCE: American Plywood Association



SOURCE: U.S. Department of Commerce

Figure 1.--Output of major timber products in California, 1959-72.

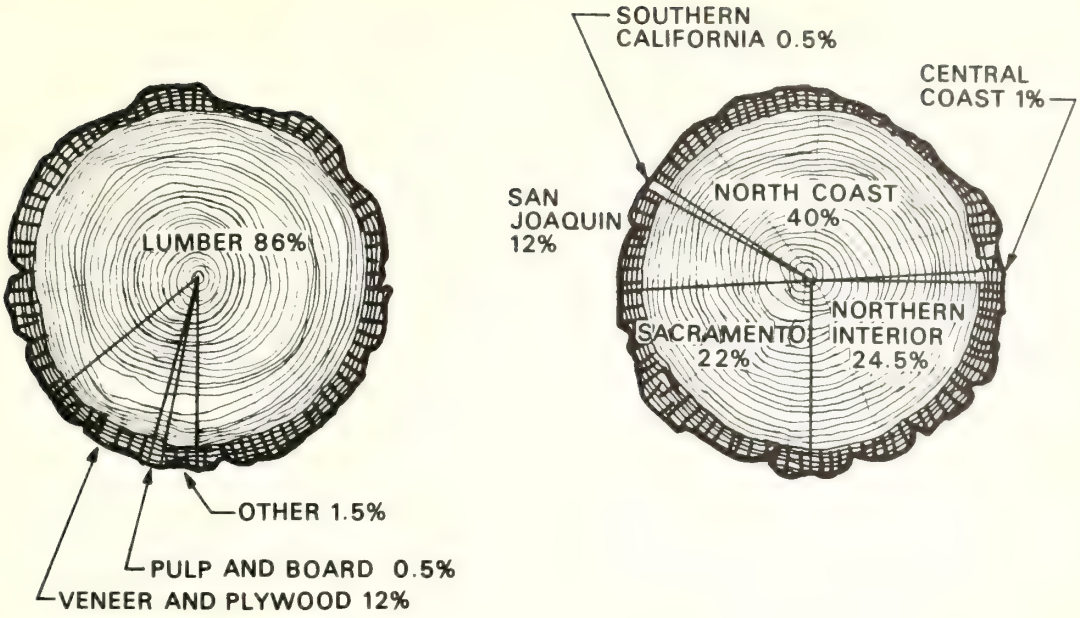


Figure 2.--Distribution of roundwood consumption by industry and area, 1972.

The forest industry has long been an important part of the State's economy. In 1972, the industry employed an average of 86,700 people, with an annual payroll over $800 million.[3/] The industry accounted for about 5 percent of all manufacturing employment and just over 4 percent of the manufacturing payrolls. The industry's contribution extends beyond this in the form of payment of State and local taxes, and purchase of labor, services, and materials that generate income throughout the economy. The importance of the industry is felt more at local levels, particularly in the northern part of the State. Specific areas, such as Humboldt County, derive as much as 90 percent of their manufacturing employment from the timber industry. In some towns, the forest industry may represent the only nonservice employment. However, urban areas with large service sectors rely very little on employment from primary processing of wood, although secondary manufacturing may be of greater importance.

California has been divided into two timber producing regions--Coastal and Interior (fig. 3). The Coastal Region consists of the counties west of the crest of the Coast Ranges, from Monterey County to the Oregon border. This region contains all of the coastal redwood forests, as well as extensive stands of Douglas-fir.

3/ California Department of Human Resources Development. California unemployment insurance reporting units by size, industry and county. Published quarterly.

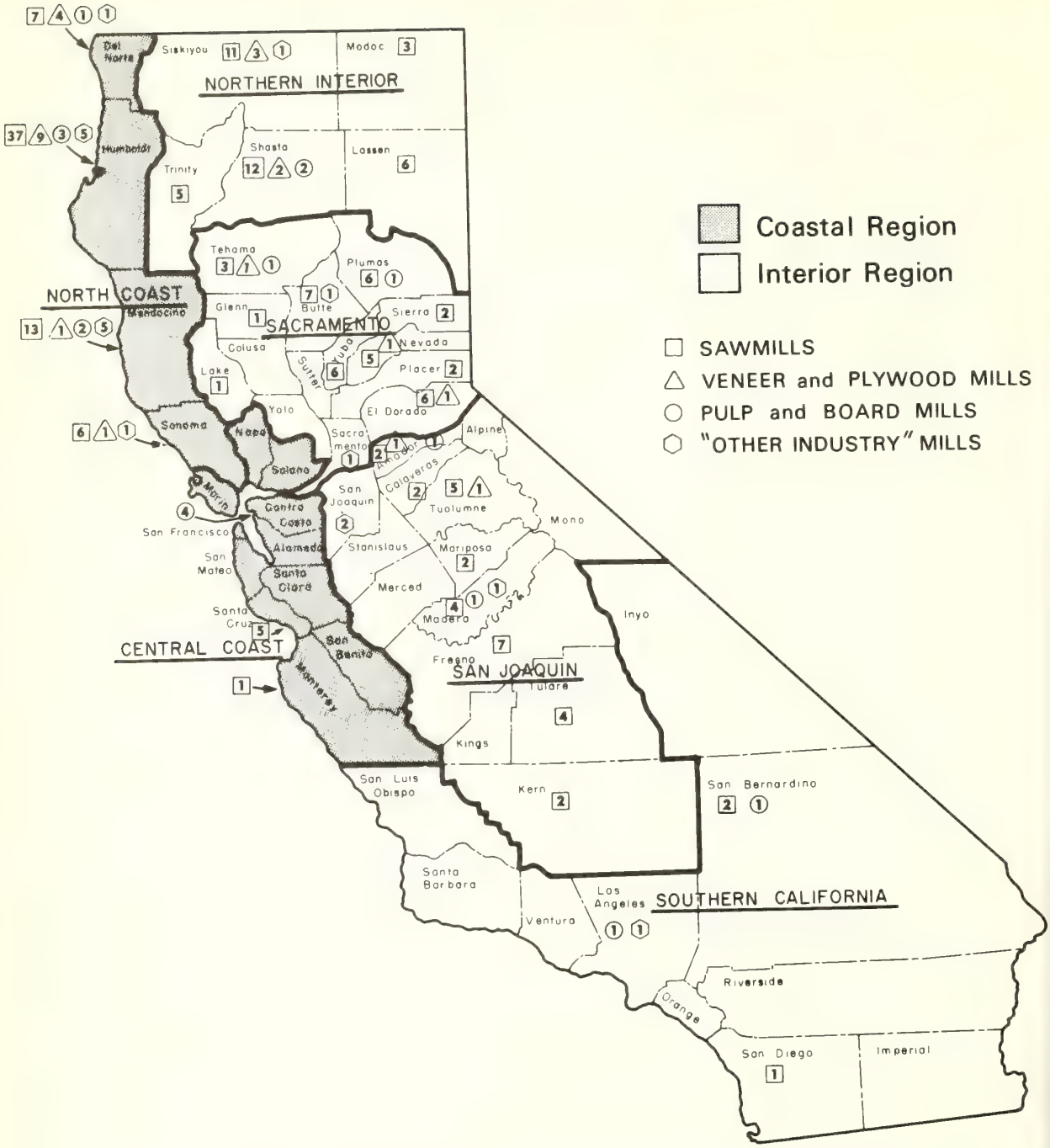


Figure 3.--Number of mills by wood producing regions and resource areas.

Within this region are two resource areas, defined by the nature of their timber resource and timber trading patterns. The North Coast is the most important timber producing area in California, as well as the center for redwood and Douglas-fir processing (fig. 2). The industry of the North Coast is the most diversified in California, with all types of primary wood processing represented (fig. 3). The forest industry of the Central Coast is not nearly as significant, having limited timber resources. However, four of the State's pulpmills[4/] are located in the Central Coast area.

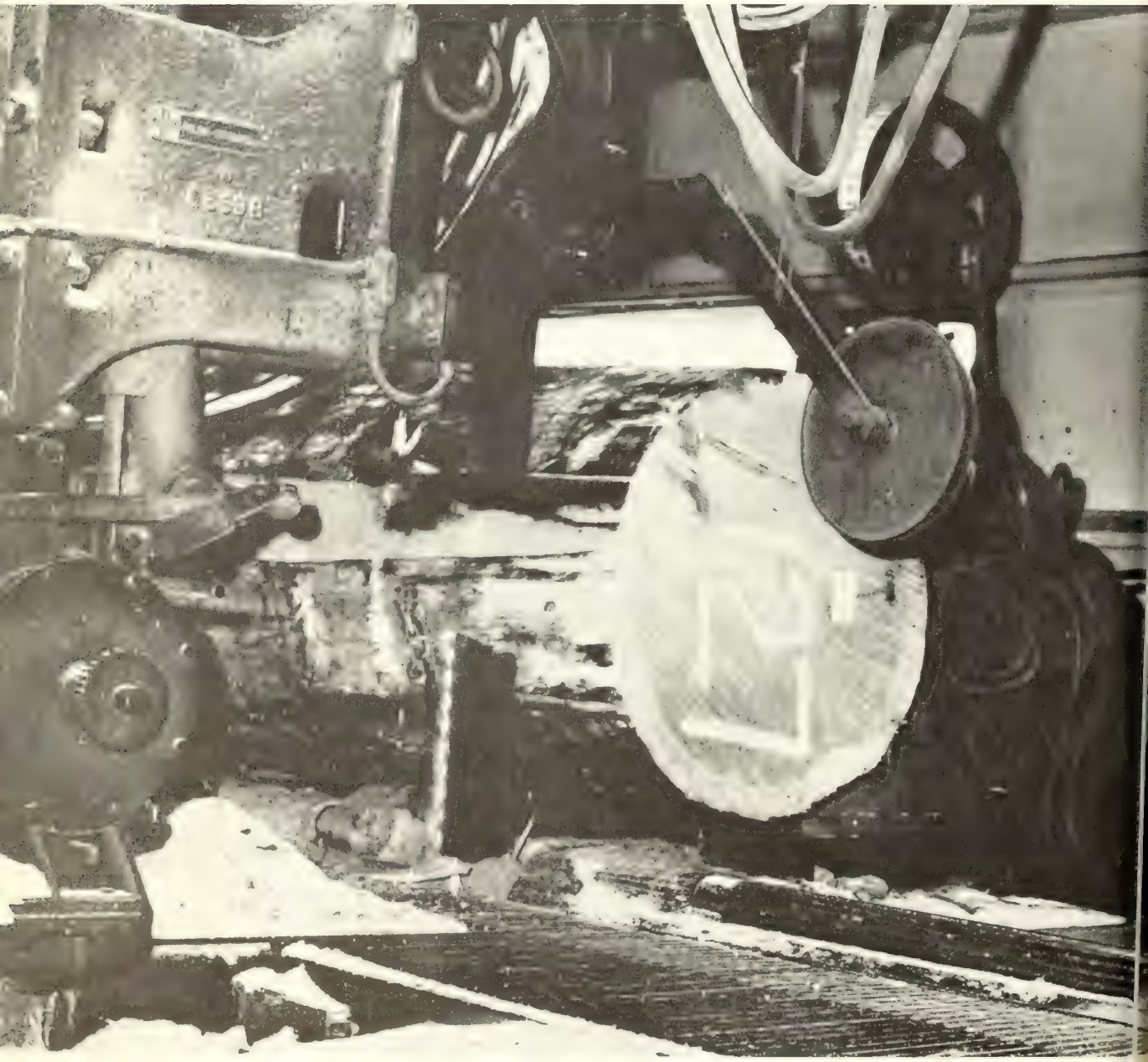
The Interior Region is divided into four resource areas, covering a wide diversity of forest types, including pines, incense-cedar, Douglas-fir, true firs, and a mixed-conifer type. The importance of the forest industry and resource decreases from north to south. The Northern Interior, Sacramento, and San Joaquin areas are major timber producers, and support a significant industry. The forest industry in the southern California area is very limited in size, supported by a relatively small timber resource base.

The forest industry of the Interior Region is less diversified than that of the Coastal Region. Sawmills comprise about 81 percent of its industry, compared with 65 percent for the Coastal Region. This situation has been changing gradually.

4/ Each pulp or board process at a location is considered to be a "mill."

THE CALIFORNIA FOREST INDUSTRY

Characteristics



FOREST INDUSTRY CONCENTRATED IN THREE NORTHERN RESOURCE AREAS

The major portion of the California forest industry is located in the three northernmost resource areas (North Coast, Northern Interior, and Sacramento), which contain about 81 percent of the State's sawtimber resource,[5/] including nearly all of the redwood timber. Almost 80 percent of all mills identified in this survey were in these areas. These mills accounted for 86 percent of the total roundwood consumption for the State.

HUMBOLDT COUNTY RANKS FIRST IN SIZE OF FOREST INDUSTRY

In 1972, Humboldt County led all counties in roundwood consumption with 1,222 million board feet, 22 percent of the State's total. Over one-fifth of all operating mills are located in the county. The nine veneer and plywood mills in the county account for 59 percent of the State's capacity. Humboldt County also has 25 percent of the sawmill capacity, and 28 percent of the pulp and board industry capacity. In addition, seaports located in the county account for most of the State's log exports.

INDUSTRY EXPANDING IN SAN JOAQUIN AREA

Since 1968, the forest industry of the San Joaquin area has increased from 31 to 35 mills. As shown below, this area was the only one of the six resource areas to expand in number of mills during this period.

In 1972, the San Joaquin area forest industry processed over 565 million board feet of roundwood, a 21-percent increase since 1968. This was the only area to show a major increase in log consumption during that time period. The timber resource of the San Joaquin area has not been utilized to the extent of that in the areas to the north. Thus, the recent growth of the industry may represent a trend of increased use of the timber resources of the San Joaquin area, at least for the short run.

5/ Daniel D. Oswald. California forest industries--prospects for the future. USDA Forest Service Resource Bulletin PNW-35, 55 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oreg., 1970.

Industry	North Coast		Central Coast		Northern Interior		Sacramento		San Joaquin		Southern California	
	1968	1972	1968	1972	1968	1972	1968	1972	1968	1972	1968	1972
Lumber	86	63	7	6	45	37	44	39	29	28	5	3
Veneer and plywood	17	15	0	0	5	5	3	3	1	2	0	0
Pulp and board	5	6	5	4	3	2	2	2	0	2	2	2
Other	8	12	4	0	0	1	3	2	1	3	0	1
Total	116	96	16	10	53	45	52	46	31	35	7	6

INDUSTRY CAPACITY UP SINCE 1968

As shown below, the capacity for all the major forest industries has increased since 1968:

	1968	1972
Sawmills (8-hour shift; thousand board feet)	16,069	16,552
Veneer and plywood (8-hour shift; thousand square feet, 3/8-inch basis)	3,569	3,973
Pulp (daily; tons, dry weight)	2,380	2,598
Particleboard (annual; million square feet, 3/4-inch basis)	239	314
Hardboard (annual; million square feet, 1/8-inch basis)	330	380

The largest increase has been in the board industry, where particleboard and hardboard increased 31 percent and 15 percent, respectively. The plywood and pulp industries both grew approximately 10 percent, while the sawmill sector grew only 3 percent in capacity. An increase in the per-mill capacity within the sawmill sector was offset by a decline in the number of mills.

SAWMILLS CONSTITUTE LARGEST SEGMENT OF INDUSTRY

Historically, sawmilling has been the major activity of the forest industry in California. Although the other sectors of the industry have grown rapidly since World War II, in 1972 the lumber industry accounted for 86 percent of all roundwood consumed in the State. Total production was down somewhat from 1956[6/] but has not changed since the last survey in 1968. The 176 operating sawmills processed 4,695 million board feet of logs in 1972, producing almost 5.4 billion board feet of lumber, 15 percent of the Nation's total.

The plywood industry ranks second in terms of number of mills, followed by the pulp and board industry. The sawmill and plywood industries account for almost 98 percent of the roundwood consumption in California.

TREND TOWARD FEWER BUT LARGER SAWMILLS CONTINUES

Following World War II, the demand for lumber rose dramatically to fulfill the needs of a booming economy. In response to this demand, many sawmills of low capacity entered the industry; by 1948 there were almost 1,000 sawmills. Due to increased competition for timber and inefficiency in the size of their operation, many of these mills either shut down or were replaced by larger mills. As shown below, the total number of mills has continued to decline; however, there are more mills in the largest size class.

As these data indicate, the number of mills consuming less than 5 million board feet of logs per year has decreased 90 percent since 1956, while the number consuming over 50 million board feet has more than doubled. In 1956, almost 60 percent of the logs were processed by mills in the two smaller size classes, compared with less than 20 percent in 1972.

6/ R. H. May and H. L. Baker. Output of timber products in California, 1956. California Forest and Range Experiment Station Forest Survey Release No. 35, 35 p. 1958.

Annual consumption class (million board feet)	1956		1962		1968		1972	
	Number	Volume consumed	Number	Volume consumed	Number	Volume consumed	Number	Volume consumed
		Million board feet		*Million board feet*		*Million board feet*		*Million board feet*
50.0+	12	800	10	864	18	1,364	28	2,044
25.0 - 49.9	49	1,711	49	1,791	55	2,061	52	1,748
5.0 - 24.9	231	2,721	133	1,725	91	1,244	59	863
0.001 - 4.9	382	609	83	119	52	63	37	40
All classes	674	5,841	275	4,499	216	4,732	176	4,694

The mills in the category 50-million-plus board feet per year have increased their consumption from 14 to 44 percent of the total.

In addition to the trend toward larger mills, there has been a substantial degree of aggregation of separate mills into one ownership.

NUMBER OF MILLS IN VENEER AND PLYWOOD INDUSTRY RELATIVELY STABLE

Since 1968, there has been a net loss of one mill in the veneer and plywood industry, indicating a degree of stability that had not existed previously. The industry had grown rapidly from 1947 to 1964, when the peak production was reached, and then gradually declined to the present number.

Although the number of mills has changed very little since 1968, log consumption has increased almost 20 percent, to 645 million board feet in 1972. This represents an increase in the average log consumption per mill, from 21 million to 26 million board feet.

ONLY BOARD INDUSTRY SHOWS INCREASED NUMBERS OF MILLS SINCE 1968

Since 1968, the number of board plants in California has increased from five to eight; at the same time the pulp sector declined by two. The new board plants were particleboard operations, two in the San Joaquin area and one in the North Coast area. The number of hardboard plants remained at one. Both pulpmill losses were groundwood operations. Although the number of pulp operations decreased, the daily capacity increased 11 percent.

ONLY 19 OPERATIONS IDENTIFIED IN "OTHER INDUSTRY" SECTOR

There were 19 operations identified in the "other industry" sector, which include export, shake and shingle, and post, pole, and piling industries. These operations accounted for less than 2 percent of the total roundwood consumption in the State. The total 1972 consumption of 92 million board feet was less than half of the 1968 figure. The major factor was the drop in log exports from 212 million board feet in 1968 to 75 million board feet in 1972. The entire shake and shingle industry and most of the log exports were located in the North Coast area. However, the post, pole, and piling industry is scattered throughout the State.

Wood Consumption

TOTAL ROUNDWOOD CONSUMPTION FOR 1972 EXCEEDS 5.4 BILLION BOARD FEET

In 1972 the forest industry consumed a total of 5.45 billion board feet of roundwood, about the same as in 1962 and 1968. As in the past, the lumber industry was the major user of roundwood, consuming 86 percent, followed by the veneer and plywood industry, with 12 percent (fig. 2). The North Coast area accounted for 40 percent of total consumption, followed by the Northern Interior and Sacramento areas, with 24.5 and 22 percent, respectively. Since the 1968 survey, the plywood industry has increased its roundwood consumption 19 percent. However, consumption by the "other industry" sector decreased 55 percent. The pulp and board industry used only 20 million board feet of logs, less than one-half of 1 percent of the total.

LOG EXPORT VOLUME DOWN 64 PERCENT SINCE 1968

In 1968, log exports in California amounted to 212 million board feet; by 1972 exports had dropped to 76 million board feet, a decrease of 64 percent. This decline in log exports was preceded by a more dramatic increase between 1966 and 1968, when export volume went from 22 million board feet to 212 million board feet. A factor in this rapid rise and fall in export volume is the fluctuation in the demand for redwood logs. In the 1960's, what appeared to be a viable new market opened up in Japan for young-growth redwood logs, and filling this demand spurred exports to the 1968 peak. However, the demand for redwood was apparently short lived. In 1972 only 7.8 million board feet of redwood was exported, about 10 percent of the total exports.

HUMBOLDT, SISKIYOU, AND MENDOCINO COUNTIES LEAD ROUNDWOOD CONSUMPTION

The forest industry of Humboldt County is the leader in log consumption, accounting for over one-fifth of the State's log consumption in 1972. Siskiyou County was second, using 548 million board feet, followed by Mendocino County, with 510 million board feet. The fourth leading county was Shasta, with 432 million board feet. These four counties account for 50 percent of the total roundwood consumption in California.

Humboldt County was also the leading producer of logs, a position it has held since the early days of the industry. Logs originating in Humboldt County amounted to 1,079 million board feet, over twice that of the next largest producer, Mendocino County. About 93 percent of the logs originating in the county were used by industry within the county.

PLYWOOD INDUSTRY LESS DEPENDENT ON DOUGLAS-FIR LOGS

Since its beginning, the plywood industry depended heavily on the Douglas-fir resource. However, as the supply of Douglas-fir decreased and the competition for the remaining resources increased, the industry had to turn elsewhere for its log input. In 1962, 88 percent of the industry's input was Douglas-fir. In 1972, the industry relied upon other species, primarily true firs, redwood, and pines, for almost 38 percent of its log supply. The tightening of the supply of Douglas-fir has also had an effect on the location of the industry. In 1962, just before the peak production of the industry, there were 39 mills in the State, 28 in the Coastal area and 11 in the Interior. In

1972, there were 15 mills in the Coastal area, and 10 in the Interior. Although additional changes have occurred during this time period, these data do point to the relative strengthening of the industry in areas where the supply of true firs, pines, and even Douglas-fir is less restricting.

USE OF DOUGLAS-FIR ROUNDWOOD CONTINUES TO DECREASE

Between 1946 and 1956, the volume of Douglas-fir used by the forest industry more than doubled. A large reserve of old-growth Douglas-fir stands existed on private ownership in the Coastal area. These stands had previously been untapped, redwood was predominately used. The post-World War II boom sharply increased demands for wood products, and these stands provided much of the resource base for increased lumber production and the new plywood industry. However, by the late 1950's, heavy cutting had greatly reduced the Douglas-fir reserves.

As the figures below show, the proportion of Douglas-fir used by the industry has decreased steadily since 1956.

Log consumption (percent)

Year	Douglas-fir	True firs	Redwood	Pines	Other
1946	19	15	10	53	3
1956	40	12	18	24	6
1962	38	15	17	23	7
1968	32	22	18	24	4
1972	27	22	19	25	7

In 1956, the forest industry consumed 2,452 million board feet of Douglas-fir logs; in 1972, this figure had dropped to 1,467 million board feet, a 40-percent decrease.

USE OF YOUNG-GROWTH TIMBER INCREASING

In 1972, the forest industry used 290 million board feet of young-growth logs, or about 24 percent, more than in 1968. Young-growth timber now accounts for almost 28 percent of the total roundwood consumption.

There are two areas of the State where the use of young growth exceeds old growth. One area includes the coastal counties from San Francisco northward through Mendocino County. This area was logged from the earliest days of settlement in California. The resulting young-growth stands now supply a major share of the area's logs. In 1972, the sawmills in this area used 127 million board feet more of young growth than old growth. The other area of the State heavily dependent on young-growth timber is the mining region of the northern Sierra Nevada. The forests of this area had been heavily cut for mining and settlement purposes during the mid- to late-1800's. During this period, and into the early 1900's, the area also was severely burned. In the 7-year period from 1932 to 1938, fires burned more than 363,000 acres.[7/] The result was the liquidation of large areas of timber which are replaced by new stands of timber or brush. In 1972, the industry in two counties within this area, Butte and El Dorado, consumed more young-growth timber than old-growth; this trend will increase in this area and throughout the State, as the old-growth timber is gradually removed.

7/ David Weeks, A. E. Wieslander, H. R. Josephson, and C. L. Hill. Land utilization in the northern Sierra Nevada. University of California, Berkeley. 127 p., 1943.

FIFTY-SIX PERCENT OF LOGS COME FROM PRIVATE LANDS

In 1972, consumption of logs from private lands totaled 3.1 billion board feet, 56 percent of the total volume used by the forest industry. This proportion is virtually the same as indicated by the 1968 survey. However, as the data below show, some change occurred within the private ownership sector.

	1968	1972
	(Percent)	
National Forest	40	41
Other public[8/]	4	3
Forest industry:		
Own lands	27	31
Other lands	9	8
Farmer and miscellaneous private	20	17

The shift in log consumption from miscellaneous private ownership lands to forest industry is partly explained by changes in ownership. Since 1968 a large block of forest land in the Northern Interior area has changed hands from miscellaneous private to forest industry. Thus, even though the logs may be coming from the same acreage as in 1968, the ownership classification has changed. Largely due to this change, log consumption from the miscellaneous private lands decreased over 50 percent in the Northern Interior. However, the remainder of the State showed an increase in logs coming from private ownership.

In 1972, the forestry industry used 2,231 million board feet of logs from National Forest land, of which 367 million board feet came from the Shasta-Trinity National Forest. The next three largest producers of logs were the Plumas, Klamath, and Lassen National Forests. These four Forests accounted for 47 percent of the logs originating on National Forest lands. Sawmills used 90 percent of the National Forest logs; the plywood industry used almost 10 percent, with the remaining volume consumed by the remaining industries.

MILL RESIDUES CONSTITUTE 92 PERCENT OF INPUT TO PULP AND BOARD INDUSTRY

In 1972, the pulp and board industry consumed 2,360,161 tons of wood fiber, 92 percent of which was residues from primary manufacture of logs. Logs chipped by the mills themselves amounted to 40,000 tons, while wood fiber from other sources totaled 152,000 tons. This latter figure is comprised of residues from secondary manufacturing, dunnage, pallets, etc., and represents a major increase in the use of these dry wood inputs. The low volume of logs used by the industry indicates that other sources of wood fiber are more readily available.

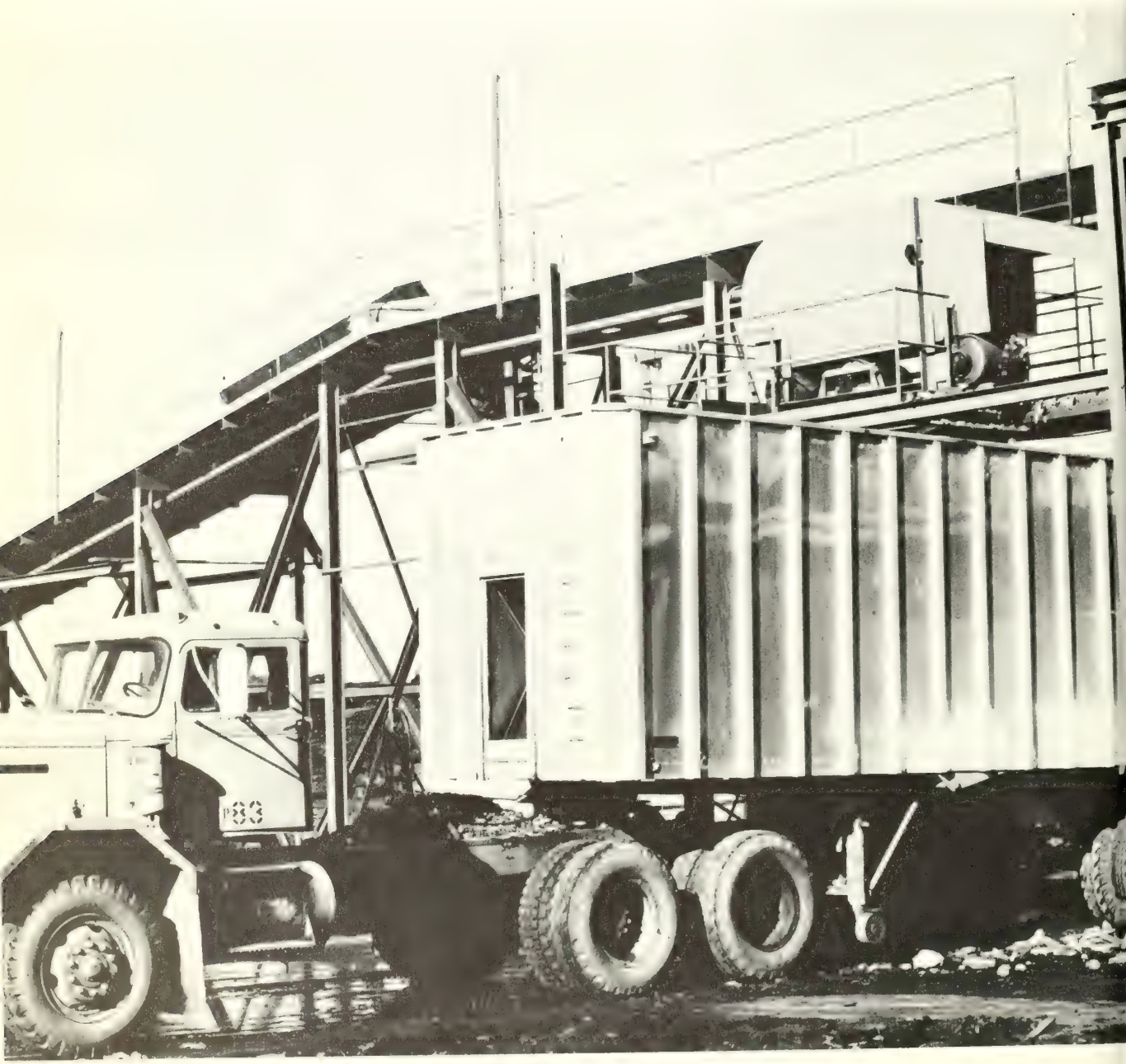
PULP AND BOARD INDUSTRY DOUBLES USE OF SAWDUST AND SHAVINGS

The use of sawdust and shavings has increased 127 percent since 1968--from 190,658 tons to 433,527 tons annually.[9/] This increase accounted for almost 60 percent of the total increase in wood fiber consumption between 1968 and 1972. This additional volume of sawdust and shavings used by the industry resulted from wider use of these materials by the pulpmills and an increase in the number of particleboard plants, major users of these fine residues.

8/ Primarily Indian tribal lands, but also includes miscellaneous Federal and municipal lands.

9/ These figures contain an insignificant volume of bark.

Mill Residues



FOREST INDUSTRY RESIDUES TOTAL 7.7 MILLION TONS

In 1972, the forest industry created 7,682,991 tons of mill residue during primary manufacture from logs. Wood residues amounted to 6.0 million tons and bark residue, 1.7 million tons. Almost 89 percent of the residue resulted from sawmilling, while 11 percent was produced by the manufacture of veneer and plywood. A very small amount, 1,910 tons, was produced by the shake and shingle industry. The industry in the North Coast area accounted for almost 43 percent of the total residue in the State.

OVER 80 PERCENT OF WOOD RESIDUE IS USED

Of the 5,953,000 tons of wood residue generated by the forest industry, 4,817,000 or 81 percent was used for various purposes. This represents a 23-percent increase in the use of wood residue since the 1968 survey. Producing mills sent 51 percent of the wood residue to the pulp and board industry. This figure includes export chips and residues used by the pulp and board plants as boiler fuel as well as input into the manufacturing process. Also included is residue sent to the Oregon pulp and board industry. Nearly 23 percent of the wood residue was used for fuel by the producing mill, or sold for that purpose. An additional 7 percent was used for a wide variety of purposes. The remaining 19 percent was not used, generally being burned or used as landfill.

HALF OF BARK RESIDUE IS USED

In 1972, bark residue created during the primary processing of logs totaled 1,730,000 tons. Nearly half of this, 860,000 tons, was used for various purposes. In 1968, only 31 percent of the bark had been used; thus the 1972 figures show a 60-percent increase in the use of bark. About half of the 860,000 tons of bark was used for fuel, and the other half was used for miscellaneous purposes such as mulch, animal bedding, gardening, and landscaping.

RESIDUE FROM PLYWOOD INDUSTRY HAS GREATEST USE

As the figures below indicate, the use of mill residues is greatest in the plywood industry.

Industry	Wood residues		Bark residues	
	Used	Unused	Used	Unused
	Percent			
Lumber	79	21	49	51
Plywood	95	5	53	47
Shake and shingle	72	28	28	72
All industries	81	19	50	50

The plywood industry created 667,000 tons of residue in 1972. Nearly 500,000 tons were sent to pulpmills and boardmills or exported. Another 140,000 tons were used for fuel and miscellaneous purposes, including lumber manufacture from cores. The total usage of 95 percent is well above the 77 percent reported in 1968.

The physical characteristics of the plywood industry might possibly explain this relatively high usage of mill residues. Three factors stand out: (1) the veneer and plywood mills are concentrated in the same areas as are the pulpmills and boardmills, major users of the mill residues; (2) many of the veneer and plywood mills tend to be larger operations than those of the other industries, thus having residue in more economic packages, and (3) many

of the plants are part of a larger, diversified milling complex, thereby creating better access to residue markets. Whatever the reason, the current situation indicates little room for expansion in the use of plywood mill residues, although some tradeoff in uses may occur.

USE OF WOOD RESIDUES FROM LARGE SAWMILLS GREATER THAN SMALL SAWMILLS

As the data below indicate, there is a positive correlation between the size of a sawmill and the percent utilization of the residue it generates. In general, the larger the mill, the greater the proportion of the residue used. Basically, the larger mills generate residue in larger amounts, which facilitates marketing or internal use. A mill creating only a low tonnage of residue annually cannot afford the investment necessary to use the residue for fuel, and likewise does not have the volume to attract outside buyers. The smaller mills did, however, make the greatest gains in residue use since 1968. This attests to the decreasing availability of unused residues from the larger mills, and the continuation of the trend toward greater utilization of mill residues.

Board-foot capacity per 8-hour shift	Percent of residue used	
	1968	1972
120,000+	82	86
80,000-119,999	62	77
40,000-79,999	39	52
Less than 40,000	16	44
All mills	64	79

APPENDIX

Measurement Units

Industries in the survey were requested to provide information on the type of scale they used for measuring their roundwood input. A summary of the reported log scales is shown below.

	Number of reported uses	
Industry	Scribner	Other
Lumber	164	16
Veneer and plywood	25	2
Pulp and board	2	--
Other	9	2
All industries	200	20

Most of the mills using logs reported their roundwood consumption in Scribner. The major exception occurred in the North Coast area where Humboldt and Spaulding scales were used by mills processing redwood. The total number of reported uses does not equal the total number of mills, because some mills reported the use of more than one scale, and some mills did not process logs. Other types of measurement units used are: cords, bolts, shake blocks, pieces, tons, cunits, and lineal feet.

All board-foot log volumes are reported in "local scale." No attempt was made to account for variations in scaling standards or to convert to a common scale.

Board foot is the unit of measure used in this report for all wood consumption with the exception of purchased or transferred veneer consumed by plywood mills (square feet, 3/8-inch basis) and mill residues consumed by pulpmills and boardmills (tons, dry weight). Consumption by mills not reported in these units was so converted using the following factors:

1 cord = 500 board feet
1 ton = 500 board feet
10.5 squares = 1,000 board feet
1 lineal foot = 3.8 board feet
1 cubic foot = 6 board feet
200 cubic-foot units = 1 bone-dry ton
1 bone-dry unit = 1.2 bone-dry tons

Board-foot lumber tally is the unit of measure used for lumber production; square feet, 3/8-inch basis for veneer and plywood production; square (100 square feet) for shake and shingle production; and board foot "local scale" for log export and post, pole, and piling shipments.

Factors to convert to metric units

1,000 cubic feet = 28.317 cubic meters
1 ton (2,000 lbs.) = 907.184 kilograms
1 square foot = 0.092903 square meter
1,000 square feet, 3/8-inch basis = 92.903 square meters, 0.9525 centimeter basis

Mill Residues

In this study no attempt was made to get individual mills to quantify the amount of residue produced. The reason for this was that although mills might be able to specify amounts of residue sold for high value uses, such as pulp chips, the lower value uses such as mulch or fuel are difficult to quantify. Therefore, the mills were asked to indicate only the percentage distribution of the disposal of their residues. These percentages were then applied to residue estimates derived through use of the following factors:

Softwood sawmill residue, redwood and incense-cedar[1/]

Average quantity of residues developed from producing 1,000 board feet of lumber

Item	Dry weight (Tons)
Wood residue:	
Slabs, edgings, and trim	0.711
Sawdust	.225
Planer shavings	.154
Total wood residue	1.090
Bark	.300
All residue	1.390

[1/] Based on data from California mills from mill-scale studies made by the U.S. Forest Service.

Softwood sawmill residue, white woods[2/]

Average quantity of residues developed from producing 1,000 board feet of lumber

Item	Dry weight (Tons)
Wood residue:	
Slabs, edgings, sawmill trim	0.508
Planer trim	.038
Sawdust	.279
Planer shavings	.203
Total wood residue	1.028
Bark	.285
All residue	1.313

[2/] Based on data from Oregon mills compiled by Oregon State University School of Forestry in 1967. Dry weights adjusted for different species mix utilized in California, primarily ponderosa pine and Douglas-fir.

Softwood plywood residue[3/]

Average quantity of residue developed in producing the equivalent of 1,000 square feet of 3/8-inch plywood (rough basis)

Item	Solid volume[4/] (Cubic feet)	Dry weight (Tons)
Wood residues:		
Log trim	3.4	0.046
Cores	3.7	.050
Veneer clippings, roundup, and spur trim	18.5	.250
Dry trim and layup loss	6.5	.088
Sander dust	1.6	.021
Total wood residue	33.7	.455
Bark	8.8	.132
All residue	42.5	.587

[3/] Based on data compiled by Oregon State University School of Forestry from Oregon mills in 1967. Because of the similarity of species used and mills, no adjustment was made in applying these data to California.

[4/] Based on equivalent green volume.

Shingle mill residues[5/]

Average quantity of residue developed in utilizing 1,000 board feet of logs, Scribner scale, or in producing the equivalent volume of 10.5 squares

Shake and shingle residue	Solid volume (Cubic feet)	Solid volume (Percent)	Dry weight per MBM (Tons)
Shingles:			
Coarse	23	13.7	0.22
Fine	78	46.8	.75
Bark	19	11.5	.28
Shakes:			
Coarse	23	13.7	.22
Fine	24	14.5	.23
Bark	19	11.5	.28
Shingle and shake:			
Coarse	23	13.7	.22
Fine	51	30.6	.49
Bark	19	11.5	.28

[5/] From information provided by the Red Cedar Shingle Bureau.

TABLES

Table 1.--*Number of mills in the forest industry by industry and resource area, California, 1972*

Resource area	All industries	Industry					
		Lumber	Veneer and plywood	Pulp and board[1/]	Other		
					Shake and shingle	Export[2/]	Posts, poles and piling
North Coast	96	63	15	6	7	4	1
Central Coast	10	6	--	4	--	--	--
Northern Interior	45	37	5	2	--	--	1
Sacramento	46	39	3	2	--	1	1
San Joaquin	35	28	2	2	--	1	2
Southern California	6	3	--	2	--	--	1
All areas	238	176	25	18	7	6	6

[1/] Each pulping process at a location is considered an individual mill.

[2/] Represents the number of identifiable operations involved in the export trade.

Table 2.--Wood consumption by mills by type of material, resource area, and industry, California, 1972

Resource area and industry	Roundwood				Other[1/]	Residue[2/]
	All roundwood	Sound logs		Utility logs		
		Live	Dead			
	Thousand board feet, local scale					*Tons*
North Coast:						
Lumber	1,711,303	1,592,884	9,730	108,689	24,143	--
Veneer and plywood	393,290	327,009	45,554	20,727	--	--
Pulp and board	6,000	--	--	6,000	--	1,443,883
Shake and shingle	2,676	605	551	1,520	--	--
Total	2,113,269	1,920,498	55,835	136,936	24,143	1,443,883
Central Coast:						
Lumber	42,720	42,520	--	200	--	--
Pulp and board	14,077	--	--	14,077	--	494,638
Total	56,797	42,520	--	14,277	--	494,638
Northern Interior:						
Lumber	1,187,630	1,139,459	23,804	24,367	2,391	--
Veneer and plywood	150,565	140,943	1,500	8,122	--	--
Pulp and board[3/]	--	--	--	--	--	306,016
Total	1,338,195	1,280,402	25,304	32,489	2,391	306,016
Sacramento:						
Lumber	1,161,580	1,134,059	17,098	10,423	--	--
Veneer and plywood[4/]	101,253	100,912	341	--	--	--
Pulp and board[3/]	--	--	--	--	--	--
Total	1,262,833	1,234,971	17,439	10,423	--	--
San Joaquin:						
Lumber	565,062	555,146	2,844	7,072	--	--
Veneer and plywood[4/]	--	--	--	--	--	--
Pulp and board[5/]	--	--	--	--	--	75,470
Total	565,062	555,146	2,844	7,072	--	75,470
Southern California:						
Lumber	26,516	25,171	1,345	--	--	--
Pulp and board[5/]	--	--	--	--	--	--
Total	26,516	25,171	1,345	--	--	--
All areas:						
Lumber	4,694,811	4,489,239	54,821	150,751	26,534	--
Veneer and plywood	645,108	568,864	47,395	28,849	--	--
Pulp and board	20,077	--	--	20,077	--	2,320,007
Shake and shingle	2,676	605	551	1,520	--	--
Export[6/]	75,665	75,665	--	--	--	--
Post, pole, and piling[6/]	13,378	13,136	--	242	1,325	--
Total	5,451,715	5,147,509	102,767	201,439	27,859	2,320,007

[1/] Includes peeler cores, cants used by sawmills, blocks, boards, bolts used by shake and shingle mills, and miscellaneous peeled products used by pole, post, and piling mills.

[2/] Includes residues from the sawmill, veneer and plywood, and shake and shingle industries, plus chips from roundwood chipping plants.

[3/] Sacramento and Northern Interior combined to avoid disclosure.

[4/] San Joaquin and Sacramento combined to avoid disclosure.

[5/] Southern California and San Joaquin combined to avoid disclosure.

[6/] All resource areas combined to avoid disclosure.

Table 3.--*Log flows to mills by State of origin, resource area, and industry, California, 1972*

(Thousand board feet, local scale)

Resource area and industry	Origin		
	Total	California	Oregon
North Coast:			
Lumber	1,711,303	1,707,511	3,792
Veneer and plywood	393,290	386,167	7,123
Pulp and board	6,000	6,000	--
Shake and shingle	2,676	2,216	460
Total	2,113,269	2,101,894	11,375
Central Coast:			
Lumber	42,720	42,720	--
Pulp and board	14,077	14,077	--
Total	56,797	56,797	--
Northern Interior:			
Lumber	1,187,630	1,185,110	2,520
Veneer and plywood	150,565	150,565	--
Pulp and board[1/]	--	--	--
Total	1,338,195	1,335,675	2,520
Sacramento:			
Lumber	1,161,580	1,161,580	--
Veneer and plywood[2/]	101,253	101,253	--
Pulp and board[1/]	--	--	--
Total	1,262,833	1,262,833	--
San Joaquin:			
Lumber	565,062	565,062	--
Veneer and plywood[2/]	--	--	--
Pulp and board[3/]	--	--	--
Total	565,062	565,062	--
Southern California:			
Lumber	26,516	26,516	--
Pulp and board[3/]	--	--	--
Total	26,516	26,516	--
All areas:			
Lumber	4,694,811	4,688,499	6,312
Veneer and plywood	645,108	637,985	7,123
Pulp and board	20,077	20,077	--
Shake and shingle	2,676	2,216	460
Export[4/]	75,665	75,665	--
Post, pole, and piling[4/]	13,378	10,782	2,596
Total	5,451,715	5,435,224	16,491

[1/] Sacramento and Northern Interior combined to avoid disclosure.

[2/] San Joaquin and Sacramento combined to avoid disclosure.

[3/] Southern California and San Joaquin combined to avoid disclosure.

[4/] All resource areas combined to avoid disclosure.

Table 4.--Log flows by county and out-of-State

(Thousand bo

Resource area and county of use	Total	North Coast				Central Coast			
		Del Norte	Humboldt	Mendocino	Sonoma	Marin	Monterey	San Mateo	Santa Cruz
North Coast:									
Del Norte	300,914	252,704	36,986	--	--	--	--	--	--
Humboldt	1,221,654	101,842	1,003,036	3,688	--	--	--	--	--
Mendocino	510,449	--	3,900	504,714	--	--	--	--	--
Sonoma	135,419	--	2,437	11,037	116,895	144	--	--	--
Total	2,168,436	354,546	1,046,359	519,439	116,895	144	--	--	--
Central Coast:									
Contra Costa	14,077	--	--	3,660	--	--	--	--	--
Monterey and Santa Cruz[1/]	42,720	--	--	--	--	--	200	10,250	32,270
Total	56,797	--	--	3,660	--	--	200	10,250	32,270
Northern Interior:									
Lassen	151,262	--	--	--	--	--	--	--	--
Modoc	43,278	--	--	--	--	--	--	--	--
Shasta	432,096	--	11,848	--	--	--	--	--	--
Siskiyou	547,909	--	5,456	--	--	--	--	--	--
Trinity	164,610	--	15,337	--	--	--	--	--	--
Total	1,339,155	--	32,641	--	--	--	--	--	--
Sacramento:									
Butte	129,857	--	--	--	--	--	--	--	--
El Dorado	162,974	--	--	--	--	--	--	--	--
Glenn, Lake, and Sacramento[1/]	48,600	--	--	--	--	--	--	--	--
Nevada and Placer[1/]	198,600	--	--	--	--	--	--	--	--
Plumas and Sierra[1/]	290,617	--	--	--	--	--	--	--	--
Tehama	231,341	--	--	--	--	--	--	--	--
Yuba	134,728	--	--	--	--	--	--	--	--
Total	1,196,717	--	--	--	--	--	--	--	--
San Joaquin:									
Amador, Calaveras, and San Joaquin[1/]	177,162	--	--	--	--	--	--	--	--
Fresno	83,310	--	--	--	--	--	--	--	--
Madera and Mariposa[1/]	85,881	--	--	--	--	--	--	--	--
Tulare and Kern[1/]	142,329	--	--	--	--	--	--	--	--
Tuolumne	171,932	--	--	--	--	--	--	--	--
Total	660,614	--	--	--	--	--	--	--	--
Southern California:									
San Bernardino, Los Angeles, and San Diego[1/]	29,996	--	--	--	--	--	--	--	--
Total	29,996	--	--	--	--	--	--	--	--
All areas	5,451,715	354,546	1,079,000	523,099	116,895	144	200	10,250	32,270

[1/] Combined to avoid disclosure.

area, and county of use, California, 1972

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Northern Interior				Sacramento										
Modoc	Shasta	Siskiyou	Trinity	Butte	El Dorado	Glenn	Lake	Nevada	Placer	Plumas	Sierra	Tehama	Yolo	Yuba
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	32,521	80,567	--	--	--	--	--	--	--	--	--	--	--
--	--	--	1,535	--	--	--	300	--	--	--	--	--	--	--
176	--	--	--	--	126	--	4,173	--	--	--	--	--	136	--
176	--	32,521	82,102	--	126	--	4,473	--	--	--	--	--	136	--
--	--	--	--	845	--	--	--	--	--	3,660	563	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	845	--	--	--	--	--	3,660	563	--	--	--
5,131	--	5,500	--	--	--	--	--	--	--	35,489	--	--	--	--
3,278	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8,010	219,137	34,463	67,272	--	--	--	--	--	255	--	--	7,990	--	--
0,291	58,065	441,431	18,298	--	--	--	--	--	--	--	--	--	--	--
--	8,352	3,442	137,479	--	--	--	--	--	--	--	--	--	--	--
6,710	285,554	484,836	223,049	--	--	--	--	--	255	35,489	--	7,990	--	--
--	1,500	--	--	56,170	901	4,250	--	187	--	61,636	164	2,212	--	1,341
--	--	--	--	--	156,661	--	--	1,158	3,000	--	--	--	--	--
--	--	--	--	--	630	45,000	1,500	525	315	--	--	--	--	--
--	--	--	--	--	14,190	--	--	38,858	103,920	7,800	33,482	--	--	350
3,597	--	--	--	--	--	--	--	1,990	430	168,929	78,288	32,926	--	--
--	15,908	--	43,764	25,368	--	27,720	--	--	--	20,296	--	98,285	--	--
--	--	--	--	18,814	--	--	--	13,205	17,340	29,051	28,309	--	--	28,009
3,597	17,408	--	43,764	100,352	172,382	76,970	1,500	55,923	125,005	287,712	140,243	133,423	--	29,700
--	--	--	--	--	61,004	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	61,004	--	--	--	--	--	--	--	--	--
--	766	1,392	1,044	--	--	--	--	--	--	--	--	--	--	--
--	766	1,392	1,044	--	--	--	--	--	--	--	--	--	--	--
),483	303,728	518,749	349,959	101,197	233,512	76,970	5,973	55,923	125,260	326,861	140,806	141,413	136	29,700

Table 4.--Log flows by county and out-of-State origins,

(Thousand bo

Resource area and county of use	San Joaquin						
	Alpine	Amador	Calaveras	Fresno	Kern	Madera	Mariposa
North Coast:							
Del Norte	--	--	--	--	--	--	--
Humboldt	--	--	--	--	--	--	--
Mendocino	--	--	--	--	--	--	--
Sonoma	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--
Central Coast:							
Contra Costa	--	--	--	--	--	--	--
Monterey and Santa Cruz 1/	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--
Northern Interior:							
Lassen	--	--	--	--	--	--	--
Modoc	--	--	--	--	--	--	--
Shasta	--	--	--	--	--	--	--
Siskiyou	--	--	--	--	--	--	--
Trinity	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--
Sacramento:							
Butte	--	--	--	--	--	--	--
El Dorado	55	1,200	--	--	--	--	--
Glenn, Lake, and Sacramento 1/	--	462	168	--	--	--	--
Nevada and Placer 1/	--	--	--	--	--	--	--
Plumas and Sierra 1/	--	--	--	--	--	--	--
Tehama	--	--	--	--	--	--	--
Yuba	--	--	--	--	--	--	--
Total	55	1,662	168	--	--	--	--
San Joaquin:							
Amador, Calaveras, and San Joaquin 1/	--	37,698	62,167	--	--	2,268	3,990
Fresno	--	--	--	75,880	--	1,481	--
Madera and Mariposa 1/	--	--	--	17,675	--	65,771	2,28
Tulare and Kern 1/	--	--	--	22,812	15,239	--	--
Tuolumne	--	--	2,396	--	--	--	7,78
Total	--	37,698	64,563	116,367	15,239	69,520	14,05
Southern California:							
San Bernardino, Los Angeles, and San Diego 1/	--	--	--	--	7,377	--	-
Total	--	--	--	--	7,377	--	-
All areas	55	39,360	64,731	116,367	22,616	69,520	14,05

1/ Combined to avoid disclosure.

d county of use, California, 1972--Continued

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aus	Tulare	Tuolumne	Southern California: Riverside	Southern California: San Bernardino	Southern California: San Diego	Out of State
	--	--	--	--	--	11,224
	--	--	--	--	--	--
	--	--	--	--	--	--
	--	--	--	--	--	151
	--	--	--	--	--	11,375
	--	5,349	--	--	--	--
	--	--	--	--	--	--
	--	5,349	--	--	--	--
	--	--	--	--	--	--
	--	--	--	--	--	--
	--	--	--	--	--	--
	--	--	--	--	--	2,520
	--	--	--	--	--	--
	--	--	--	--	--	2,520
	--	--	--	--	--	1,496
	--	450	--	--	--	--
	--	--	--	--	--	--
	--	--	--	--	--	--
	--	--	--	--	--	--
	--	--	--	--	--	--
	--	--	--	--	--	--
	--	450	--	--	--	1,496
	825	8,110	--	--	--	1,100
	5,949	--	--	--	--	--
	--	--	--	--	--	--
	102,678	--	--	--	--	--
	--	161,754	--	--	--	--
	109,452	169,864	--	--	--	1,100
	--	--	2,898	15,963	278	--
	--	--	2,898	15,963	278	--
	109,452	175,663	2,898	15,963	278	16,491

Table 5.--Log flow to mills from National Forests, by resource area and county, California, 1972

(Thousand board feet, local scale)

Resource area and county of use	All National Forests	Cleveland	El Dorado	Inyo	Klamath	Lassen	Mendocino	Modoc	Plumas	San Bernardino	Sierra	Sequoia	Shasta-Trinity	Six Rivers	Stanislaus	Tahoe	Out-of-State National Forests
North Coast:																	
Del Norte	61,081	--	---	--		--	--	--	--	--	--	--	--	61,081	--	--	--
Humboldt	172,945	--	--	--	34,420	--	--	--	--	--	--	--	37,745	99,566	--	--	1,214
Mendocino	27,770	--	--	--	--	--	27,403	--	--	--	--	--	--	367	--	--	--
Sonoma	175	--	--	--	--	--	--	175	--	--	--	--	--	--	--	--	--
Total	261,971	--	--	--	34,420	--	27,403	175	--	--	--	--	37,745	161,014	--	--	1,214
Central Coast:																	
Contra Costa	--	--	--	--	--		--	--	--	--	--	--	--	--	--	--	--
Monterey and Santa Cruz[1/]	--	--	--	--	--		--	--	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	--		--	--	--	--	--	--	--	--	--	--	--
Northern Interior:																	
Lassen	126,075	--	--	--	--	87,039	--	13,432	25,604	--	--	--	--	--	--	--	--
Modoc	30,270	--	--	--	--	--	--	30,270	--	--	--	--	--	--	--	--	--
Shasta	182,105	--	--	--	3,500	41,765	387	4,500	--	--	--	--	131,953	--	--	--	--
Siskiyou	270,592	--	--	--	187,179	1,285	--	19,983	--	--	--	--	55,833	5,456	--	--	856
Trinity	147,868	--	--	--	3,338	--	--	--	--	--	--	--	125,880	18,650	--	--	--
Total	756,910	--	--	--	194,017	130,089	387	68,185	25,604	--	--	--	313,666	24,106	--	--	856
Sacramento:																	
Butte	61,041	--	--	--	--	8,925	2,975	--	43,131	--	--	--	--	--	--	6,010	--
El Dorado	78,097	--	78,070	--	--	--	--	--	--	--	--	--	--	--	--	27	--
Glenn, Lake, and Sacramento[1/]	23,491	--	504	--	--	--	22,651	--	--	--	--	--	--	--	168	168	--
Nevada and Placer[1/]	104,021	--	33,090	--	--	--	--	--	3,425	--	--	--	--	--	--	67,506	--
Plumas and Sierra[1/]	227,396	--	--	--	--	38,394	--	--	140,625	--	--	--	--	--	--	48,377	--
Tehama	75,574	--	--	--	--	25,414	23,828	--	11,037	--	--	--	15,295	--	--	--	--
Yuba	89,173	--	--	--	--	--	--	--	26,792	--	--	--	--	--	--	62,381	--
Total	658,793	--	111,664	--	--	72,733	49,454	--	225,010	--	--	--	15,295	--	168	184,469	--
San Joaquin:																	
Amador, Calaveras, and San Joaquin[1/]	118,069	--	69,929	--	--	--	--	--	--	--	2,174	--	--	--	45,966	--	--
Fresno	76,556	--	--	--	--	--	--	--	--	--	54,222	22,334	--	--	--	--	--
Madera and Mariposa[1/]	83,027	--	--		--	--	--	--	--	--	82,877	--	--	--	150	--	--
Tulare and Kern[1/]	121,416	--	--	1,440	--	--	--	--	--	--	17,640	102,336	--	--	--	--	--
Tuolumne	133,003								--	--	--	--	--	--	133,003	--	--
Total	532,071	--	69,929	1,440	--	--	--	--	--	--	156,913	124,670	--	--	179,119	--	--
Southern California:																	
San Bernardino, Los Angeles, and San Diego[1/]	21,092	211	--	--	--	--	--	--	--	14,980	--	5,901	--	--	--	--	--
Total	21,092	211	--	--	--	--	--	--		14,980	--	5,901	--	--	--	--	--
All areas	2,230,837	211	181,593	1,440	228,437	202,822	77,244	68,360	250,614	14,980	156,913	130,571	366,706	185,120	179,287	184,469	2,070

[1/] Combined to avoid disclosure.

Table 6.--Log flow to mills from National Forests, by industry and resource area, California, 1972

(Thousand board feet, local scale)

Resource area and industry	All National Forests	Cleveland	El Dorado	Inyo	Klamath	Lassen	Mendocino	Modoc	Plumas	San Bernardino	Sierra	Sequoia	Shasta-Trinity	Six Rivers	Stanislaus	Tahoe	Out-of-State National Forests
North Coast:																	
Lumber	195,974	--	--	--	31,940	--	27,403	--	--	--	--	--	32,993	103,638	--	--	--
Veneer and plywood	65,301	--	--	--	2,480	--	--	--	--	--	--	--	4,752	56,855	--	--	1,214
Pulp and board	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Shake and shingle	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	261,275	--	--	--	34,420	--	27,403	--	--	--	--	--	37,745	160,493	--	--	1,214
Northern Interior:																	
Lumber	666,676	--	--	--	136,458	125,992	387	68,185	25,604	--	--	--	285,088	24,106	--	--	856
Veneer and plywood	90,234	--	--	--	57,559	4,097	--	--	--	--	--	--	28,578	--	--	--	--
Pulp and board	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	756,910	--	--	--	194,017	130,089	387	68,185	25,604	--	--	--	313,666	24,106	--	--	856
Sacramento:																	
Lumber	643,558	--	110,545	--	--	67,115	45,709	--	224,765	--	--	--	12,173	--	--	183,251	--
Veneer and plywood[1/]	65,802	--	11,077	--	--	5,618	3,745	--	175	--	--	--	3,122	--	41,015	1,050	--
Pulp and board	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	709,360	--	121,622	--	--	72,733	49,454	--	224,940	--	--	--	15,295	--	41,015	184,301	--
San Joaquin:																	
Lumber	474,774	--	58,617	1,440	--	--	--	--	--	--	156,629	124,670	--	--	133,418	--	--
Veneer and plywood[1/]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pulp and board	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	474,774	--	58,617	1,440	--	--	--	--	--	--	156,629	124,670	--	--	133,418	--	--
Southern California:																	
Lumber	21,092	211	--	--	--	--	--	--	--	14,980	--	5,901	--	--	--	--	--
Pulp and board	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	21,092	211	--	--	--	--	--	--	--	14,980	--	5,901	--	--	--	--	--
All areas:																	
Lumber	2,002,074	211	169,162	1,440	168,398	193,107	73,499	68,185	250,369	14,980	156,629	130,571	330,254	127,744	133,418	183,251	856
Veneer and plywood	221,337	--	11,077	--	60,039	9,715	3,745	--	175	--	--	--	36,452	56,855	41,015	1,050	1,214
Pulp and board	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Shake and shingle	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Exports[2/]	1,408	--	1,354	--	--	--	--	--	--	--	284	--	--	521	4,704	168	--
Post, pole, and piling	535	--	--	--	--	--	--	175	70	--	--	--	--	--	150	--	--
Total	2,225,354	211	181,593	1,440	228,437	202,822	77,244	68,360	250,614	14,980	156,913	130,571	366,706	185,120	179,287	184,469	2,070

1/ [illegible]

2/ [illegible]

Table 7.--Dependency of mills for logs, by ownership origin, resource area, and industry, California, 1972

(Number of mills)

Resource area and industry	National Forest				State				Bureau of Land Management				Other public				Forest industry: Own wood supply				Forest industry: Other wood supply				Farmer and miscellaneous private			
	Dependency percent																											
	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100
North Coast:																												
Lumber	48	5	4	6	56	6	1	--	58	4	1	--	61	1	1	--	33	7	7	16	48	8	2	5	26	8	8	21
Veneer and plywood	9	1	2	3	14	1	--	--	14	1	--	--	13	1	--	1	6	--	2	7	14	--	--	1	5	8	2	--
Pulp and board	6	--	--	--	6	--	--	--	6	--	--	--	6	--	--	--	5	--	--	1	6	--	--	--	6	--	--	--
Shake and shingle	7	--	--	--	4	--	--	3	7	--	--	--	7	--	--	--	7	--	--	--	4	2	--	1	3	2	--	2
Export	3	1	--	--	4	--	--	--	4	--	--	--	4	--	--	--	4	--	--	--	1	--	--	3	3	--	--	1
Post, pole, and piling	--	--	1	--	1	--	--	--	1	--	--	--	1	--	--	--	1	--	--	--	1	--	--	--	--	--	1	--
Total	73	7	7	9	85	7	1	3	90	5	1	--	92	2	1	1	56	7	9	24	74	10	2	10	43	18	11	24
Central Coast:																												
Lumber	6	--	--	--	6	--	--	--	6	--	--	--	6	--	--	--	6	--	--	--	6	--	--	--	--	--	--	6
Pulp and board	4	--	--	--	4	--	--	--	4	--	--	--	4	--	--	--	2	--	2	--	2	--	2	--	4	--	--	--
Total	10	--	--	--	10	--	--	--	10	--	--	--	10	--	--	--	8	--	2	--	8	--	2	--	4	--	--	6
Northern Interior:																												
Lumber	2	7	8	20	35	2	--	--	30	7	--	--	35	2	--	--	29	3	5	--	28	2	6	1	13	18	5	1
Veneer and plywood	--	1	2	2	5	--	--	--	4	1	--	--	5	--	--	--	2	2	1	--	3	1	1	--	2	3	--	--
Pulp and board	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--
Post, pole, and piling	1	--	--	--	1	--	--	--	1	--	--	--	1	--	--	--	--	--	1	--	--	1	--	--	--	--	1	--
Total	5	8	10	22	43	2	--	--	37	8	--	--	43	2	--	--	33	5	7	--	33	4	7	1	17	21	6	1
Sacramento:																												
Lumber	4	11	12	12	39	--	--	--	36	2	--	1	38	1	--	--	25	4	7	3	31	8	--	--	10	13	8	8
Veneer and plywood	--	1	2	--	3	--	--	--	3	--	--	--	3	--	--	--	1	1	1	--	3	--	--	--	1	--	1	1
Pulp and board	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--
Export	--	--	1	--	1	--	--	--	7	--	--	--	1	--	--	--	1	--	--	--	--	--	1	--	--	1	--	--
Post, pole, and piling	--	1	--	--	1	--	--	--	1	--	--	--	1	--	--	--	1	--	--	--	--	--	1	--	--	--	1	--
Total	6	13	15	12	46	--	--	--	43	2	--	1	45	1	--	--	30	5	8	3	36	8	2	--	13	14	10	9
San Joaquin:																												
Lumber	1	3	2	22	27	1	--	--	28	--	--	--	27	1	--	--	23	4	--	1	27	1	--	--	8	15	2	3
Veneer and plywood	--	--	--	2	2	--	--	--	2	--	--	--	2	--	--	--	--	2	--	--	2	--	--	--	2	--	--	--
Pulp and board	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--
Export	--	1	--	--	--	1	--	--	1	--	--	--	1	--	--	--	1	--	--	--	--	--	1	--	--	1	--	--
Post, pole, and piling	1	1	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	1	1	--	--	--	--	--	2
Total	4	5	2	24	33	2	--	--	35	--	--	--	34	1	--	--	28	6	--	1	32	2	1	--	12	16	2	5
Southern California:																												
Lumber	1	1	--	1	3	--	--	--	3	--	--	--	3	--	--	--	3	--	--	--	3	--	--	--	--	1	--	2
Pulp and board	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--
Post, pole, and piling	1	--	--	--	1	--	--	--	1	--	--	--	1	--	--	--	--	--	1	--	--	1	--	--	--	--	1	--
Total	4	1	--	1	6	--	--	--	6	--	--	--	6	--	--	--	5	--	1	--	5	1	--	--	2	1	1	2
All areas:																												
Lumber	62	27	26	61	166	9	1	--	161	13	1	1	170	5	1	--	119	18	19	20	143	19	8	6	57	55	23	41
Veneer and plywood	9	3	6	7	24	1	--	--	23	2	--	--	23	1	--	1	9	4	5	7	22	1	1	1	10	11	3	1
Pulp and board	18	--	--	--	18	--	--	--	18	--	--	--	18	--	--	--	15	--	2	1	16	--	2	--	18	--	--	--
Shake and shingle	7	--	--	--	4	--	--	3	7	--	--	--	7	--	--	--	7	--	--	--	4	2	--	1	3	2	--	2
Export	3	2	1	--	5	1	--	--	6	--	--	--	6	--	--	--	6	--	--	--	1	--	2	3	3	2	--	1
Post, pole, and piling	3	2	1	--	6	--	--	--	6	--	--	--	6	--	--	--	4	--	2	--	2	3	1	--	--	--	4	2
Total	102	34	34	68	223	11	1	3	221	15	1	1	230	6	1	1	160	22	28	28	188	25	14	11	91	70	30	47

Table 8.--Log consumption of all mills, by ownership class, resource area, and industry, California, 1972

(Thousand board feet, local scale)

Resource area and industry	All owners	State	National Forest	Bureau of Land Management	Other public	Forest industry		Farmer and miscellaneous private
						Own wood supply	Other wood supply	
North Coast:								
Lumber	1,711,303	33,230	195,974	15,016	33,162	869,682	122,250	441,989
Veneer and plywood	393,290	1,595	65,301	1,320	13,400	258,418	17,401	35,855
Pulp and board	6,000	--	--	--	--	6,000	--	--
Shake and shingle	2,676	241	--	--	--	1,350	275	810
Total	2,113,269	35,066	261,275	16,336	46,562	1,135,450	139,926	478,654
Central Coast:								
Lumber	42,720	--	--	--	--	--	--	42,720
Pulp and board	14,077	--	--	--	--	7,742	6,335	--
Total	56,797	--	--	--	--	7,742	6,335	42,720
Northern Interior:								
Lumber	1,187,630	5,742	666,676	16,837	15,382	194,536	181,397	107,060
Veneer and plywood	150,565	--	90,234	1,638	--	18,116	30,007	10,570
Pulp and board[1/]	--	--	--	--	--	--	--	--
Total	1,338,195	5,742	756,910	18,475	15,382	212,652	211,404	117,630
Sacramento:								
Lumber	1,161,580	--	643,558	4,603	400	248,441	40,224	224,354
Veneer and plywood[2/]	101,253	--	65,802	--	--	25,292	--	10,159
Pulp and board[1/]	--	--	--	--	--	--	--	--
Total	1,262,833	--	709,360	4,603	400	273,733	40,224	234,513
San Joaquin:								
Lumber	565,062	2,000	474,774	--	1,600	46,004	3,100	37,584
Veneer and plywood[2/]	--	--	--	--	--	--	--	--
Pulp and board[3/]	--	--	--	--	--	--	--	--
Total	565,062	2,000	474,774	--	1,600	46,004	3,100	37,584
Southern California:								
Lumber	26,516	--	21,092	--	--	--	--	5,424
Pulp and board[3/]	--	--	--	--	--	--	--	--
Total	26,516	--	21,092	--	--	--	--	5,424
All areas:								
Lumber	4,694,811	40,972	2,002,074	36,456	50,544	1,358,663	346,971	859,131
Veneer and plywood	645,108	1,595	221,337	2,958	13,400	301,826	47,408	56,584
Pulp and board	20,077	--	--	--	--	13,742	6,335	--
Shake and shingle	2,676	241	--	--	--	1,350	275	810
Export[4/]	75,665	1,890	7,031	--	--	--	38,157	28,587
Post, pole, and piling[4/]	13,378	--	395	--	--	1,554	3,847	7,582
Total	5,451,715	44,698	2,230,837	39,414	63,944	1,677,135	442,993	952,694

1/ Sacramento and Northern Interior combined to avoid disclosure.

2/ San Joaquin and Sacramento combined to avoid disclosure.

3/ Southern California and San Joaquin combined to avoid disclosure.

4/ All resource areas combined to avoid disclosure.

Table 9.--Log consumption by mills by species, resource area, and industry, California, 1972

(Thousand board feet, local scale)

Resource area and industry	All species	Douglas-fir	Hemlock	True firs	Redwood	Ponderosa and sugar pines	Incense-cedar	Other softwoods	Hardwoods
North Coast:									
Lumber	1,711,303	584,503	13,809	58,410	949,724	59,589	2,694	40,843	1,731
Veneer and plywood	393,290	315,312	2,482	28,579	42,213	443	--	4,261	--
Pulp and board	6,000	3,600	--	--	2,400	--	--	--	--
Shake and shingle	2,676	--	--	--	2,006	--	--	670	--
Total	2,113,269	903,415	16,291	86,989	996,343	60,032	2,694	45,774	1,731
Central Coast:									
Lumber	42,720	9,078	--	--	15,200	--	--	18,440	2
Pulp and board	14,077	9,150	--	4,927	--	--	--	--	--
Total	56,797	18,228	--	4,927	15,200	--	--	18,440	2
Northern Interior:									
Lumber	1,187,630	280,575	1,200	296,520	--	503,711	93,157	12,467	--
Veneer and plywood	150,565	80,949	--	50,434	--	19,182	--	--	--
Pulp and board[1/]	--	--	--	--	--	--	--	--	--
Total	1,338,195	361,524	1,200	346,954	--	522,893	93,157	12,467	--
Sacramento:									
Lumber	1,161,580	140,744	1,479	391,472	--	505,710	57,186	53,941	11,048
Veneer and plywood[2/]	101,253	7,056	--	86,422	--	7,550	--	225	--
Pulp and board[1/]	--	--	--	--	--	--	--	--	--
Total	1,262,833	147,800	1,479	477,894	--	513,260	57,186	54,166	11,048
San Joaquin:									
Lumber	565,062	5,569	--	246,949	--	243,481	66,635	2,428	--
Veneer and plywood[2/]	--	--	--	--	--	--	--	--	--
Pulp and board[3/]	--	--	--	--	--	--	--	--	--
Total	565,062	5,569	--	246,949	--	243,481	66,635	2,428	--
Southern California:									
Lumber	26,516	--	--	2,372	--	23,866	15	263	--
Pulp and board[3/]	--	--	--	--	--	--	--	--	--
Total	26,516	--	--	2,372	--	23,866	15	263	--
All areas:									
Lumber	4,694,811	1,020,469	16,488	995,723	964,924	1,336,357	219,687	128,382	12,781
Veneer and plywood	645,108	403,317	2,482	165,435	42,213	27,175	--	4,486	--
Pulp and board	20,077	12,750	--	4,927	2,400	--	--	--	--
Shake and shingle	2,676	--	--	--	2,006	--	--	670	--
Export[4/]	75,665	21,586	2,981	20,101	7,754	13,372	1,113	8,758	--
Post, pole, and piling[4/]	13,378	8,745	--	251	--	4,281	--	101	--
Total	5,451,715	1,466,867	21,951	1,186,437	1,019,297	1,381,185	220,800	142,397	12,781

1/ Sacramento and Northern Interior combined to avoid disclosure.

2/ San Joaquin and Sacramento combined to avoid disclosure.

3/ Southern California and San Joaquin combined to avoid disclosure.

4/ All resource areas combined to avoid disclosure.

Table 10.--Production and disposition of wood and bark residues by mills by use, resource area, and residue-producing industry, California, 1972

(Tons, dry weight)

Resource area and residue-producing industry	Wood residue						Bark residue					
	All wood	Used 1/				Unused	All bark	Used 1/				Unused
		Total	Pulp and board	Fuel	Miscellaneous			Total	Pulp and board	Fuel	Miscellaneous	
North Coast:												
Lumber	2,137,248	1,653,923	1,193,420	334,432	126,071	483,325	607,866	161,789	--	105,541	56,248	446,077
Veneer and plywood	417,614	396,908	301,068	57,718	38,122	20,706	122,613	54,114	--	54,114	--	68,499
Shake and shingle	1,351	976	26	434	516	375	559	157	--	157	--	402
Total	2,556,213	2,051,807	1,494,514	392,584	164,709	504,406	731,038	216,060	--	159,812	56,248	514,978
Central Coast:												
Lumber	41,624	41,624	1,531	2,105	37,988	--	12,864	12,188	--	--	12,188	676
Total	41,624	41,624	1,531	2,105	37,988	--	12,864	12,188	--	--	12,188	676
Northern Interior:												
Lumber	1,270,923	1,032,795	579,484	412,505	40,806	238,128	379,344	251,905	--	175,400	76,505	127,439
Veneer and plywood	139,577	137,190	109,565	14,268	13,357	2,387	28,734	17,603	--	14,435	3,168	11,131
Total	1,410,500	1,169,985	689,049	426,773	54,163	240,515	408,078	269,508	--	189,835	79,673	138,570
Sacramento:												
Lumber	1,250,452	988,250	524,013	444,581	19,656	262,202	363,544	218,836	--	79,442	139,394	144,708
Veneer and plywood 2/	110,173	102,005	85,353	14,959	1,693	8,168	32,053	26,073	--	1,064	25,009	5,980
Total	1,360,625	1,090,255	609,366	459,540	21,349	270,370	395,597	244,909	--	80,506	164,403	150,688
San Joaquin:												
Lumber	556,993	436,492	257,502	94,358	84,632	120,501	175,252	110,090	--	5,832	104,258	65,162
Veneer and plywood 2/	--	--	--	--	--	--	--	--	--	--	--	--
Total	556,993	436,492	257,502	94,358	84,632	120,501	175,252	110,090	--	5,832	104,258	65,162
Southern California:												
Lumber	26,649	26,647	2,121	90	24,436	2	7,558	7,557	--	48	7,509	1
Total	26,649	26,647	2,121	90	24,436	2	7,558	7,557	--	48	7,509	1
All areas:												
Lumber	5,283,889	4,179,731	2,558,071	1,288,071	333,589	1,104,158	1,546,428	762,365	--	366,263	396,102	784,063
Veneer and plywood	667,364	636,103	495,986	86,945	53,172	31,261	183,400	97,790	--	69,613	28,177	85,610
Shake and shingle	1,351	976	26	434	516	375	559	157	--	157	--	402
Total	5,952,604	4,816,810	3,054,083	1,375,450	387,277	1,135,794	1,730,387	860,312	--	436,033	424,279	870,075

1/ Residues not necessarily used in the resource area in which produced.

2/ San Joaquin and Sacramento combined to avoid disclosure.

Table 11.--*Number of sawmills by mill-size class, resource area, and county, California, 1972*

Resource area and county	All classes	Mill-size class[1/]			
		D	C	B	A
North Coast:					
Del Norte	7	1	2	3	1
Humboldt	37	4	7	11	15
Mendocino	13	1	--	3	9
Sonoma	6	2	3	--	1
Total	63	8	12	17	26
Central Coast:					
Monterey	1	1	--	--	--
Santa Cruz	5	1	3	1	--
Total	6	2	3	1	--
Northern Interior:					
Lassen	6	2	2	1	1
Modoc	3	--	2	1	--
Shasta	12	4	1	4	3
Siskiyou	11	2	--	3	6
Trinity	5	--	--	2	3
Total	37	8	5	11	13
Sacramento:					
Butte	7	3	2	1	1
El Dorado	6	2	--	3	1
Glenn	1	--	--	1	--
Lake	1	1	--	--	--
Nevada	5	1	1	3	--
Placer	2	--	--	2	--
Plumas	6	--	2	3	1
Sierra	2	--	1	1	--
Tehama	3	--	--	1	2
Yuba	6	1	2	3	--
Total	39	8	8	18	5
San Joaquin:					
Amador	2	--	--	--	2
Calaveras	2	--	1	--	1
Fresno	7	4	1	1	1
Kern	2	1	--	1	--
Madera	4	1	--	3	--
Mariposa	2	1	1	--	--
Tulare	4	--	1	1	2
Tuolumne	5	1	1	1	2
Total	28	8	5	7	8
Southern California:					
San Bernardino	2	1	1	--	--
San Diego	1	1	--	--	--
Total	3	2	1	--	--
All areas	176	36	34	54	52

[1/] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

Table 12.--*Installed capacity of sawmills by mill-size class, resource area and county, California, 1972*

(Thousand board feet, lumber tally)

Resource area and county	Total capacity	Mill-size class[1/]			
		D	C	B	A
North Coast:					
Del Norte	635	30	135	270	200
Humboldt	4,110	70	420	1,064	2,556
Mendocino	1,863	20	--	293	1,550
Sonoma	355	30	140	--	185
Total	6,963	150	695	1,627	4,491
Central Coast:					
Monterey	4	4	--	--	--
Santa Cruz	244	4	160	80	--
Total	248	8	160	80	--
Northern Interior:					
Lassen	462	22	140	80	220
Modoc	210	--	110	100	--
Shasta	896	44	64	370	418
Siskiyou	1,456	32	--	310	1,114
Trinity	545	--	--	170	375
Total	3,569	98	314	1,030	2,127
Sacramento:					
Butte	446	56	110	80	200
El Dorado	460	10	--	250	200
Glenn	100	--	--	100	--
Lake	30	30	--	--	--
Nevada	410	35	70	305	--
Placer	200	--	--	200	--
Plumas	598	--	145	278	175
Sierra	170	--	70	100	--
Tehama	558	--	--	88	470
Yuba	435	10	135	290	--
Total	3,407	141	530	1,691	1,045
San Joaquin:					
Amador	320	--	--	--	320
Calaveras	200	--	50	--	150
Fresno	337	20	72	115	130
Kern	100	5	--	95	--
Madera	315	35	--	280	--
Mariposa	41	1	40	--	--
Tulare	425	--	75	80	270
Tuolumne	550	30	60	100	360
Total	2,288	91	297	670	1,230
Southern California:					
San Bernardino	76	6	70	--	--
San Diego	1	1	--	--	--
Total	77	7	70	--	--
All areas	16,552	495	2,066	5,098	8,893

[1/] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

Table 13.--*Number of sawmills by mill-size class, resource area, and selected equipment, California, 1972*

Resource area and selected equipment	All classes	Mill-size class[1/]			
		D	C	B	A
North Coast:					
Barker	48	1	7	15	25
Chipper	55	4	8	17	26
Planer	53	4	11	14	24
Burner	51	4	10	16	21
Kiln	22	1	5	4	12
Central Coast:					
Barker	2	--	2	--	--
Chipper	4	--	3	1	--
Planer	4	1	2	1	--
Burner	1	--	1	--	--
Kiln	--	--	--	--	--
Northern Interior:					
Barker	22	1	1	7	13
Chipper	22	--	1	8	13
Planer	26	2	3	9	12
Burner	27	4	5	10	8
Kiln	20	--	1	8	11
Sacramento:					
Barker	27	1	5	16	5
Chipper	26	1	4	16	5
Planer	33	4	6	18	5
Burner	27	3	8	14	2
Kiln	22	--	3	14	5
San Joaquin:					
Barker	15	--	2	6	7
Chipper	15	--	2	6	7
Planer	15	3	2	5	5
Burner	13	1	4	4	4
Kiln	12	--	2	5	5
Southern California:					
Barker	1	--	1	--	--
Chipper	1	--	1	--	--
Planer	1	--	1	--	--
Burner	--	--	--	--	--
Kiln	1	--	1	--	--
All areas:					
Barker	115	3	18	44	50
Chipper	123	5	19	48	51
Planer	132	14	25	47	46
Burner	119	12	28	44	35
Kiln	77	1	12	31	33

[1/] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

Table 14.--*Number of sawmills by selected equipment, resource area, and county, California, 1972*

Resource area and county	Barker	Chipper	Planer	Burner	Kiln
North Coast:					
Del Norte	5	7	5	5	2
Humboldt	28	32	31	28	12
Mendocino	12	12	11	13	5
Sonoma	3	4	6	5	3
Total	48	55	53	51	22
Central Coast:					
Monterey	--	--	1	--	--
Santa Cruz	2	4	3	1	--
Total	2	4	4	1	--
Northern Interior:					
Lassen	2	2	3	4	3
Modoc	--	--	3	3	1
Shasta	7	7	9	8	7
Siskiyou	9	9	7	7	6
Trinity	4	4	4	5	3
Total	22	22	26	27	20
Sacramento:					
Butte	3	3	7	4	2
El Dorado	3	3	5	2	3
Glenn	1	1	1	1	1
Lake	1	1	--	1	--
Nevada	4	4	4	4	3
Placer	2	2	2	2	2
Plumas	5	4	6	5	4
Sierra	1	1	1	1	1
Tehama	3	3	3	2	3
Yuba	4	4	4	5	3
Total	27	26	33	27	22
San Joaquin:					
Amador	2	2	1	1	1
Calaveras	2	2	1	1	--
Fresno	2	2	3	1	2
Kern	1	1	1	--	--
Madera	3	3	2	2	2
Mariposa	--	--	--	1	--
Tulare	2	2	4	2	4
Tuolumne	3	3	3	5	3
Total	15	15	15	13	12
Southern California:					
San Bernardino	1	1	1	--	1
San Diego	--	--	--	--	--
Total	1	1	1	--	1
All areas	115	123	132	119	77

Table 15.--Number of sawmills by type and size of headrig,[1] resource area, and mill-size class, California, 1972

Resource area and mill-size class[2]	Circular saw				Band saw				Gang saw			Chipping saw			Scragg double-cut saw		
	2 feet	4 feet	6 feet	8+ feet	4 feet	6 feet	8 feet	10+ feet	2 feet	3 feet	4 feet	2 feet	3 feet	4 feet	2 feet	3 feet	4 feet
North Coast:																	
D	--	1	5	--	--	1	--	--	--	--	--	--	--	--	--	--	1
C	--	2	2	1	--	3	3	1	--	--	--	--	--	--	--	--	--
B	--	1	1	--	1	6	7	--	--	1	--	--	--	--	--	--	--
A	--	--	--	--	3	10	11	--	--	1	1	--	--	--	--	--	--
Total	--	4	8	1	4	20	21	1	--	2	1	--	--	--	--	--	1
Central Coast:																	
D	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C	--	--	2	--	--	--	--	1	--	--	--	--	--	--	--	--	--
B	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	4	--	--	1	--	1	--	--	--	--	--	--	--	--	--
Northern Interior:																	
D	--	6	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C	--	--	--	--	--	1	3	--	--	--	--	--	--	1	--	--	--
B	--	--	1	--	--	5	5	--	--	--	--	--	--	--	--	--	--
A	--	--	--	--	--	5	5	3	--	--	--	--	--	--	--	--	--
Total	--	6	3	--	--	11	13	3	--	--	--	--	--	1	--	--	--
Sacramento:																	
D	--	2	5	--	--	--	--	--	--	--	--	--	--	--	--	1	--
C	1	--	1	2	--	3	1	--	--	--	--	--	--	--	--	--	--
B	--	--	--	1	2	5	6	4	--	--	--	--	--	--	--	--	--
A	--	--	--	--	--	3	2	--	--	--	--	--	--	--	--	--	--
Total	1	2	6	3	2	11	9	4	--	--	--	--	--	--	--	1	--
San Joaquin:																	
D	--	2	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C	--	--	1	--	1	1	1	1	--	--	--	--	--	--	--	--	--
B	--	1	--	--	--	1	3	1	--	--	1	--	--	--	--	--	--
A	--	--	1	--	--	2	4	1	--	--	--	--	--	--	--	--	--
Total	--	3	8	--	1	4	8	3	--	--	1	--	--	--	--	--	--
Southern California:																	
D	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	2	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All areas:																	
D	--	13	20	--	--	1	--	--	--	--	--	--	--	--	--	1	1
C	1	2	7	3	1	8	8	3	--	--	--	--	--	1	--	--	--
B	--	2	2	1	3	18	21	5	--	1	1	--	--	--	--	--	--
A	--	--	1	--	3	20	22	4	--	1	1	--	--	--	--	--	--
Total	1	17	30	4	7	47	51	12	--	2	2	--	--	1	--	1	1

[1] Sizes of headrigs are upper limits; the 6-foot size class includes saws 49 through 72 inches.

[2] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

Table 16.--*Number of sawmills by years of present ownership, years at present site, and mill-size class, California, 1972*

Mill-size class[1/] and years at present site	All mills	Tenure of present mill ownership (years)				
		0-2	3-5	6-10	11-20	21+
D:						
0 - 2	6	3	1	--	--	2
3 - 5	7	--	6	1	--	--
6 - 10	7	1	2	4	--	--
11 - 20	10	1	1	--	7	1
21+	6	--	--	--	--	6
Total	36	5	10	5	7	9
C:						
0 - 2	1	1	--	--	--	--
3 - 5	2	--	2	--	--	--
6 - 10	7	1	1	5	--	--
11 - 20	8	--	3	--	5	--
21+	16	2	--	3	3	8
Total	34	4	6	8	8	8
B:						
0 - 2	1	--	--	--	--	1
3 - 5	2	--	2	--	--	--
6 - 10	3	--	1	1	--	1
11 - 20	18	1	7	4	6	--
21 +	30	4	4	3	9	10
Total	54	5	14	8	15	12
A:						
0 - 2	3	3	--	--	--	--
3 - 5	2	1	1	--	--	--
6 - 10	4	--	1	3	--	--
11 - 20	13	7	2	--	4	--
20+	30	6	5	5	6	8
Total	52	17	9	8	10	8
All classes:						
0 - 2	11	7	1	--	--	3
3 - 5	13	1	11	1	--	--
6 - 10	21	2	5	13	--	1
11 - 20	49	9	13	4	22	1
21+	82	12	9	11	18	32
Total	176	31	39	29	40	37

[1/] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

Table 17.--*Average number of operating days of sawmills by resource area and mill-size class, California, 1972*

Resource area	Average number of operating days per year				
	Mill-size class[1/]				Average, all classes
	D	C	B	A	
North Coast	161	213	240	244	227
Central Coast	43	162	205	--	130
Northern Interior	116	221	235	251	213
Sacramento	132	226	242	261	218
San Joaquin	95	186	216	223	178
Southern California	85	234	--	--	135
All areas	119	209	236	244	209

[1/] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

Table 18.--*Wood consumption by sawmills by type of material consumed, resource area, and mill-size class, California, 1972*

(Thousand board feet)

Resource area and mill-size class[1/]	All wood	Roundwood				Other	
		All roundwood	Sound logs		Utility logs	Peeler cores	Cants
			Live	Dead			
	Local log scale					*Lumber tally*	
North Coast:							
D	33,834	21,685	11,480	40	10,165	12,149	--
C	149,824	146,089	108,021	3,240	34,828	3,735	--
B	443,455	442,205	403,333	2,950	35,922	--	1,250
A	1,108,333	1,101,324	1,070,050	3,500	27,774	7,009	--
Total	1,735,446	1,711,303	1,592,884	9,730	108,689	22,893	1,250
Central Coast:							
B, C, and D[2/]	42,720	42,720	42,520	--	200	--	--
Northern Interior:							
D	10,177	7,786	6,881	300	605	2,287	104
C	79,886	79,886	75,886	3,500	500	--	--
B	314,271	314,271	306,728	3,173	4,370	--	--
A	785,687	785,687	749,964	16,831	18,892	--	--
Total	1,190,021	1,187,630	1,139,459	23,804	24,367	2,287	104
Sacramento:							
D	13,995	13,995	13,048	26	921	--	--
C	154,639	154,639	152,689	1,300	650	--	--
B	551,974	551,974	536,253	10,845	4,876	--	--
A	440,972	440,972	432,069	4,927	3,976	--	--
Total	1,161,580	1,161,580	1,134,059	17,098	10,423	--	--
San Joaquin:							
D	5,769	5,769	4,555	2	1,212	--	--
C	82,420	82,420	78,800	520	3,100	--	--
B	154,391	154,391	150,631	1,000	2,760	--	--
A	322,482	322,482	321,160	1,322	--	--	--
Total	565,062	565,062	555,146	2,844	7,072	--	--
Southern California:							
C and D[2/]	26,516	26,516	25,171	1,345	--	--	--
All areas:							
D	63,775	49,235	35,964	368	12,903	14,436	104
C	493,285	489,550	440,567	9,905	39,078	3,735	--
B	1,506,811	1,505,561	1,439,465	17,968	48,128	--	1,250
A	2,657,474	2,650,465	2,573,243	26,580	50,642	7,009	--
Total	4,721,345	4,694,811	4,489,239	54,821	150,751	25,180	1,354

[1/] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

[2/] Combined to avoid disclosure.

Table 19.--*Log consumption by sawmills by timber age group, resource area, and mill-size class, California, 1972*

(Thousand board feet, local scale)

Resource area and mill-size class[1/]	All age groups	Old growth (100+ years)	Young growth (less than 100 years)
North Coast:			
D	21,685	14,057	7,628
C	146,089	86,476	59,613
B	442,205	332,776	109,429
A	1,101,324	644,497	456,827
Total	1,711,303	1,077,806	633,497
Central Coast:			
B, C, and D[2/]	42,720	6,250	36,470
Northern Interior:			
D	7,786	4,351	3,435
C	79,886	67,156	12,730
B	314,271	226,361	87,910
A	785,687	659,553	126,134
Total	1,187,630	957,421	230,209
Sacramento:			
D	13,995	9,315	4,680
C	154,639	118,218	36,421
B	551,974	351,780	200,194
A	440,972	321,571	119,401
Total	1,161,580	800,884	360,696
San Joaquin:			
D	5,769	4,732	1,037
C	82,420	48,780	33,640
B	154,391	120,937	33,454
A	322,482	295,051	27,431
Total	565,062	469,500	95,562
Southern California:			
C and D[2/]	26,516	21,200	5,316
All areas:			
D	49,235	32,455	16,780
C	489,550	341,830	147,720
B	1,505,561	1,038,104	467,457
A	2,650,465	1,920,672	729,793
Total	4,694,811	3,333,061	1,361,750

[1/] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

[2/] Combined to avoid disclosure.

Table 20.--*Log consumption by sawmills by timber age group, resource area, and county, California, 1972*

(Thousand board feet, local scale)

Resource area and county	All age groups	Old growth (100+ years)	Young growth (less than 100 years)
North Coast:			
Del Norte	163,991	125,706	38,285
Humboldt	973,118	713,784	259,334
Mendocino	455,366	207,690	247,676
Sonoma	118,828	30,626	88,202
Total	1,711,303	1,077,806	633,497
Central Coast:			
Monterey and Santa Cruz[1/]	42,720	6,250	36,470
Northern Interior:			
Lassen	151,262	129,356	21,906
Modoc	43,278	37,101	6,177
Shasta	372,101	284,183	87,918
Siskiyou	456,379	362,833	93,546
Trinity	164,610	143,948	20,662
Total	1,187,630	957,421	230,209
Sacramento:			
Butte	127,520	63,088	64,432
El Dorado	158,474	77,900	80,574
Glenn, Lake, and Tehama[1/]	255,141	149,900	105,241
Placer and Nevada[1/]	195,100	153,054	42,046
Plumas and Sierra[1/]	290,617	250,603	40,014
Yuba	134,728	106,339	28,389
Total	1,161,580	800,884	360,696
San Joaquin:			
Calaveras and Amador[1/]	116,822	108,690	8,132
Fresno	83,310	55,943	27,367
Madera and Mariposa[1/]	85,281	59,348	25,933
Tulare and Kern[1/]	142,329	133,527	8,802
Tuolumne	137,320	111,992	25,328
Total	565,062	469,500	95,562
Southern California:			
San Bernardino and San Diego[1/]	26,516	21,200	5,316
All areas	4,694,811	3,333,061	1,361,750

[1/] Combined to avoid disclosure.

Table 21.--*Log inventory changes, log consumption, and apparent log receipts by sawmills by resource area, California, 1972*

(Thousand board feet, local scale)

Resource area	Log inventory			1972 log consumption	Apparent 1972 log receipts
	January 1, 1972	December 31, 1972	Net change		
North Coast	375,642	386,885	11,243	1,711,303	1,722,546
Central Coast	6,510	510	-6,000	42,720	36,720
Northern Interior	365,832	387,792	21,960	1,187,630	1,209,590
Sacramento	362,177	320,016	-42,161	1,161,580	1,119,419
San Joaquin	170,539	170,158	-381	565,062	564,681
Southern California	3,797	3,748	-49	26,516	26,467
All areas	1,284,497	1,269,109	-15,388	4,694,811	4,679,423

Table 22.--Log consumption of sawmills by ownership class, resource area, and mill-size class, California, 1972

(Thousand board feet, local scale)

Resource area and mill-size class 1/	All owners	State	National Forest	Bureau of Land Management	Other public	Forest industry		Farmer and miscellaneous private
						Own wood supply	Other wood supply	
North Coast:								
D	21,685	--	--	--	--	--	13,500	8,185
C	146,089	--	36,360	770	--	32,700	32,131	44,128
B	442,205	5,945	32,749	6,650	--	220,121	56,789	119,951
A	1,101,324	27,285	126,865	7,596	33,162	616,861	14,830	269,725
Total	1,711,303	33,230	195,974	15,016	33,162	869,682	122,250	441,989
Central Coast:								
B, C, and D 2/	42,720	--	--	--	--	--	--	42,720
Northern Interior:								
D	7,786	--	5,350	--	--	--	751	1,685
C	79,886	900	57,159	900	--	--	16,969	3,958
B	314,271	4,842	216,314	7,686	--	2,475	44,689	38,265
A	785,687	--	387,853	8,251	15,382	192,061	118,988	63,152
Total	1,187,630	5,742	666,676	16,837	15,382	194,536	181,397	107,060
Sacramento:								
D	13,995	--	4,137	83	400	600	32	8,743
C	154,639	--	99,435	--	--	10,835	1,722	42,647
B	551,974	—	338,097	2,000	--	90,499	15,306	106,072
A	440,972	--	201,889	2,520	--	146,507	23,164	66,892
Total	1,161,580	--	643,558	4,603	400	248,441	40,224	224,354
San Joaquin:								
D	5,769	--	5,215	--	--	--	--	554
C	82,420	--	67,219	--	--	1,600	--	13,601
B	154,391	450	132,207	--	1,600	13,600	--	6,534
A	322,482	1,550	270,133	--	--	30,804	3,100	16,895
Total	565,062	2,000	474,774	--	1,600	46,004	3,100	37,584
Southern California:								
C and D 2/	26,516	--	21,092	--	--	--	--	5,424
All areas:								
D	49,235	--	14,702	83	400	600	14,283	19,167
C	489,550	900	281,265	1,670	--	45,135	50,822	109,798
B	1,505,561	11,237	719,367	16,336	1,600	326,695	116,784	313,542
A	2,650,465	28,835	986,740	18,367	48,544	906,233	165,082	416,664
Total	4,694,811	40,972	2,002,074	36,456	50,544	1,358,663	346,971	859,131

1/ Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

2/ Combined to avoid disclosure.

Table 23.--Log consumption of sawmills by ownership class, resource area, and county, California, 1972

(Thousand board feet, local scale)

Resource area and county	All owners	State	National Forest	Bureau of Land Management	Other public	Forest industry		Farmer and miscellaneous private
						Own wood supply	Other wood supply	
North Coast:								
Del Norte	163,991	--	33,835	--	--	89,415	28,396	12,345
Humboldt	973,118	--	134,369	14,236	33,162	498,382	78,994	213,975
Mendocino	455,366	23,564	27,770	780	--	251,686	13,929	137,637
Sonoma	118,828	9,666	—	—	--	30,199	931	78,032
Total	1,711,303	33,230	195,974	15,016	33,162	869,682	122,250	441,989
Central Coast:								
Monterey and Santa Cruz[1/]	42,720	--	--	--	--	--	--	42,720
Northern Interior:								
Lassen	151,262	900	126,075	2,010	--	--	--	22,277
Modoc	43,278	--	30,270	--	--	--	13,008	--
Shasta	372,101	4,842	154,391	3,750	--	59,010	92,601	57,507
Siskiyou	456,379	--	208,072	4,989	15,038	133,051	75,788	19,441
Trinity	164,610	--	147,868	6,088	344	2,475	--	7,835
Total	1,187,630	5,742	666,676	16,837	15,382	194,536	181,397	107,060
Sacramento:								
Butte	127,520	--	60,971	--	--	16,537	8,532	41,480
El Dorado	158,474	--	78,007	83	400	47,945	--	32,039
Glenn, Lake, and Tehama[1/]	255,141	--	85,740	2,520	--	111,390	--	55,491
Placer and Nevada[1/]	195,100	--	102,271	2,000	--	46,907	9,422	34,500
Plumas and Sierra[1/]	290,617	--	227,396	--	--	25,662	21,203	16,356
Yuba	134,728	--	89,173	--	--	--	1,067	44,488
Total	1,161,580	--	643,558	4,603	400	248,441	40,224	224,354
San Joaquin:								
Calaveras and Amador[1/]	116,822	1,550	86,881	--	--	15,081	3,100	10,210
Fresno	83,310	450	76,556	--	--	--	--	6,304
Madera and Mariposa[1/]	85,281	--	82,877	--	--	--	--	2,404
Tulare and Kern[1/]	142,329	--	121,416	--	1,600	15,200	--	4,113
Tuolumne	137,320	--	107,044	--	--	15,723	--	14,553
Total	565,062	2,000	474,774	--	1,600	46,004	3,100	37,584
Southern California:								
San Bernardino and San Diego[1/]	26,516	--	21,092	--	--	--	--	5,424
All areas	4,694,811	40,972	2,002,074	36,456	50,544	1,358,663	346,971	859,131

[1/] Combined to avoid disclosure.

Table 24.--Dependency of sawmills for logs by ownership origin, resource area, and mill-size class, California, 1972

(Number of mills)

Resource area and mill-size class[1/]	National Forest				State				Bureau of Land Management				Other public				Forest industry				Other private			
	Dependency percent																							
	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100
North Coast																								
D	8	--	--	--	8	--	--	-	8	-	-	-	8	--	-	--	8	--	--	--	6	--		
C	9	1	1	1	12	--	--		11	1	-		12	--		-			1	1		--		
B	3	2	2	--	16	--	1	-	17	-	1	-	17	--		-		1	2		2			1
A	18	2	1	5	20	5	--	-	23	3	-	-	24	1	1	--	7	-	4		21	5		
Total	48	5	4	6	56	1	1	--	58	4	1	--	61	1	1	--	53	2	7	1	48	8		
Central Coast																								
D	2	--	--	--	2	--	--	-	2	-	-	-	2	--	--	--	2	--	--	--	2	--		
C	3				3				3				3	--	--	--	3	--	--	--			--	--
B	1	-	-	-	1				1	--	--	-	1	--	--	--	1		-		1	--	-	
Total	6	--	--	-	6	--	--	-	6	--	--	--	6	--	--	--	6	--	-	-	6	--	--	
Northern Interior																								
D	2	--	2	4	8	--	--	--	8	-	--	-	8	--	--	--	8	--	--	--	7	--	1	
C	--	1	1	3	4	1	--	--	4	1	--	--	5	--	-	--	5	--		--	3	--		1
B	--	1	3	7	10	1	--	--	8	3	--	--	11	-			10	1			8		2	
A	--	5	2	6	13	--	--	--	10	3	--	--	11	2			6	2	-		10	1		
Total	2	7	8	20	35	2	--	--	30	7	--	--	35	2	-	-	29	3		-	28	2	6	1
Sacramento																								
D	3	4	1	-	8	--	--	--	7	-		1	7	1		-	7	--	-		7	1	--	
C	1	1	3	3	8	--	--	--	8				8	--		--	7	--	-		7	1	--	
B	--	5	5	8	18	-	--	-	17	1	-		18	--	--	--	11	2	4	1	14	4	--	--
A	--	1	3	1	5	-	--	-	4	1		--	5	--	--	--	--	2	3	--	3	2	--	-
Total	4	11	12	12	39	--	--	--	36	2	--	1	38	1			25	4		1	31	8	--	
San Joaquin																								
D	1	1	1	5	8	--	--	--	8	--	--	--	8	--	--		8	--	--					
C	--	1	1	3	5	--	--	--	5	--	--	--	5	--	-		4	1	--	-	5	--	-	
B	--	1	-	6	7	--	--	--	7	--	--	--	6	1	--	--	6	--		1	7	--	--	-
A	--	--	--	8	7	1	--	--	8	--	--	--	8	--	-	--	5	3	-		7	1	-	
Total	1	3	2	22	27	1	--	-	28	--	--	--	27	1	--	--	23	4	-	1	27			
Southern California																								
D	1	1	--	--	2	--	--	-	2	--	--	--	2	--	--	--	2	--	--		2	--	--	
C	--	--	--	1	1	--	--	--	1	--	--	--	1	--	--	--	1	--	--		1	--	--	--
Total	1	1	--	1	3	--	--	--	3	--	--	--	3	--			3	--		--	3	--	--	--
All areas																								
D	17	6	4	9	36	--	--	--	35	--		1	35	1	-		31	-	--	1	31	1	1	2
C	13	4	6	11	33		--	--	32	2	--	-	34	--	-		24	4		2	28	2		
B	14	9	10	21	52	1	1	-	49	4		-	53	1	-		37	4	6	7	42	7	4	1
A	18	8	6	20	45	7	--	-	45	7	--	--	48	3	1	-	15	12	2	1	41	9	2	--
Total	62	27	26	61	166	9	1	--	161	13	1	1	173	5	1	--	107	21	10	11	143	19	7	3

[1/] Mill-size classes are as follows: Class A mills = 120,000+ board-feet capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

Table 25.--Log consumption by sawmills by species, resource area, and mill-size class, California, 1972

(Thousand board feet, local scale)

Resource area and mill-size class[1/]	All species	Douglas-fir	Hemlock	True firs	Redwood	Ponderosa and sugar pines	Incense-cedar	Other softwoods	Hardwoods
North Coast:									
D	21,685	2,988	--	--	13,815	440	—	2,742	1,700
C	146,089	39,664	1,713	27,684	62,275	987	--	13,735	31
B	442,205	177,496	7,953	6,503	228,688	17,641	558	3,366	--
A	1,101,324	364,355	4,143	24,223	644,946	40,521	2,136	21,000	—
Total	1,711,303	584,503	13,809	58,410	949,724	59,589	2,694	40,843	1,731
Central Coast:									
B, C, and D[2/]	42,720	9,078	--	--	15,200	--	--	18,440	2
Northern Interior:									
D	7,786	5,306	--	405	--	873	220	982	--
C	79,886	121	--	12,732	--	37,349	29,684	--	--
B	314,271	73,453	1,200	72,902	--	127,010	39,706	--	--
A	785,687	201,695	--	210,481	--	338,479	23,547	11,485	--
Total	1,187,630	280,575	1,200	296,520	--	503,711	93,157	12,467	--
Sacramento:									
D	13,995	3,498	--	31	--	1,076	6,054	306	3,030
C	154,639	14,271	1,479	46,949	--	69,314	7,242	7,366	8,018
B	551,974	82,617	--	225,775	--	200,665	30,457	12,460	--
A	440,972	40,358	--	118,717	--	234,655	13,433	33,809	--
Total	1,161,580	140,744	1,479	391,472	--	505,710	57,186	53,941	11,048
San Joaquin:									
D	5,769	--	--	836	--	202	4,631	100	--
C	82,420	1,575	--	36,022	--	35,186	9,637	--	--
B	154,391	990	--	86,620	--	53,927	12,531	323	--
A	332,482	3,004	--	123,471	--	154,166	39,836	2,005	--
Total	565,062	5,569	--	246,949	--	243,481	66,635	2,428	--
Southern California:									
C and D[2/]	26,516	--	--	2,372	--	23,866	15	263	--
All areas:									
D	49,235	11,792	--	1,272	13,815	2,591	10,905	4,130	4,730
C	489,550	55,631	3,192	125,759	62,275	166,702	46,578	21,634	8,049
B	1,505,561	343,634	9,153	391,800	243,888	399,243	83,252	34,589	2
A	2,650,465	609,412	4,143	476,892	644,946	767,821	78,952	68,299	--
Total	4,694,811	1,020,469	16,488	995,723	964,924	1,336,357	219,687	128,382	12,781

[1/] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

[2/] Combined to avoid disclosure.

Table 26.--Log consumption by sawmills by species, resource area, and type of material, California, 1972

(Thousand board feet, local scale)

Resource area and type of material	All species	Douglas-fir	Hemlock	True firs	Redwood	Ponderosa and [illegible] pines	Incense-cedar	Other [illegible]	[illegible]
North Coast:									
Sound	1,602,615	533,474	13,632	55,146	906,755	58,790	2,648	[illegible]	[illegible]
Utility	108,688	51,029	177	3,264	42,969	799	46	[illegible]	--
Total	1,711,303	584,503	13,809	58,410	949,724	59,589	2,694	40,843	1,731
Central Coast:									
Sound	42,520	9,048	--	--	15,030	--	--	18,440	2
Utility	200	30	--	--	170	--	--	--	--
Total	42,720	9,078	--	--	15,200	--	--	18,440	2
Northern Interior:									
Sound	1,163,262	267,159	1,200	292,994	--	499,890	89,870	12,149	--
Utility	24,368	13,416	--	3,526	--	3,421	3,287	318	--
Total	1,187,630	280,575	1,200	296,520	--	503,711	93,157	12,467	--
Sacramento:									
Sound	1,151,157	136,842	1,476	389,215	--	504,202	55,258	53,116	[illegible]
Utility	10,423	3,902	3	2,257	--	1,508	1,928	825	[illegible]
Total	1,161,580	140,744	1,479	391,472	--	505,710	57,186	53,941	[illegible]
San Joaquin									
Sound	557,990	5,389	--	243,198	--	241,948	65,052	2,403	--
Utility	7,072	180	--	3,751	--	1,533	1,583	25	--
Total	565,062	5,569	--	246,949	--	243,481	66,635	2,428	--
Southern California:									
Sound	26,516	--	--	2,372	--	23,866	15	263	--
Utility	--	--	--	--	--	--	--	--	--
Total	26,516	--	--	2,372	--	23,866	15	263	--
All areas:									
Sound	4,544,060	951,912	16,308	982,925	921,785	1,328,696	212,843	116,810	12,781
Utility	150,751	68,557	180	12,798	43,139	7,661	6,844	[illegible]	--
Total	4,694,811	1,020,469	16,488	995,723	964,924	1,336,357	219,687	128,382	[illegible]

Table 27.--Log consumption by sawmills by species, resource area, and county, California, 1972

(Thousand board feet, local scale)

Resource area and county	All species	Douglas-fir	Hemlock	True firs	Redwood	Ponderosa and sugar pines	Incense-cedar	Other softwoods	Hardwoods
North Coast:									
Del Norte	163,991	26,142	3,237	21,750	112,862	--	—	--	--
Humboldt	973,118	385,917	6,666	25,309	517,404	20,128	1,778	15,016	900
Mendocino	455,366	103,961	3,843	11,351	276,284	39,211	916	19,800	—
Sonoma	118,828	68,48[illegible]	63	--	43,174	250	--	6,027	831
Total	1,711,303	584,503	13,809	58,410	949,724	59,589	2,694	40,843	1,731
Central Coast:									
Monterey and Santa Cruz[1/]	42,720	9,078	--	--	15,200	--	--	18,440	2
Northern Interior:									
Lassen	151,262	8,143	--	46,801	--	93,801	2,135	382	--
Modoc	43,278	120	--	10,929	--	30,310	1,919	—	—
Shasta	372,101	67,129	1,200	78,047	--	167,609	57,516	600	--
Siskiyou	456,379	120,090	--	140,034	--	161,619	23,151	11,485	--
Trinity	164,610	85,093	--	20,709	--	50,372	8,436	--	--
Total	1,187,630	280,575	1,200	296,520	--	503,711	93,157	12,467	--
Sacramento:									
Butte	127,520	11,775	--	59,519	--	21,409	17,447	6,352	11,018
El Dorado	158,474	10,725	--	30,692	—	112,070	1,606	3,381	--
Glenn, Lake, and Tehama[1/]	255,141	53,184	--	29,471	--	132,127	6,250	34,109	--
Placer and Nevada[1/]	195,100	15,433	--	91,500	--	78,642	9,525	--	—
Plumas and Sierra[1/]	290,617	22,390	1,479	141,637	—	107,392	12,859	4,860	--
Yuba	134,728	27,237	--	38,653	--	54,070	9,499	5,239	30
Total	1,161,580	140,744	1,479	391,472	--	505,710	57,186	53,941	11,048
San Joaquin:									
Calaveras and Amador[1/]	116,822	3,531	--	21,361	—	56,785	35,145	—	--
Fresno	83,310	--	--	48,238	--	28,223	6,777	72	--
Madera and Mariposa[1/]	85,281	--	—	55,474	--	19,651	9,833	323	--
Tulare and Kern[1/]	142,329	--	—	77,029	--	54,617	8,650	2,033	--
Tuolumne	137,320	2,038		44,847	--	84,205	6,230	--	--
Total	565,062	5,569	--	246,949	--	243,481	66,635	2,428	--
Southern California:									
San Bernardino and San Diego[1/]	26,516	--	--	2,372	--	23,866	15	263	--
All areas	4,694,811	1,020,469	16,488	995,723	964,924	1,336,357	219,687	128,382	12,781

[1/] Combined to avoid disclosure.

Table 28.--Production and disposition of wood and bark residues by sawmills by resource area and mill-size class, California, 1972

(Tons, dry weight)

Resource area and mill-size class[1]	All residues			Wood residue			Bark residue		
	Total	Used[2]	Unused	Total	Used[2]	Unused	Total	Used[2]	Unused
North Coast:									
D	30,060	17,384	12,676	25,861	15,259	10,602	4,199	2,125	2,074
C	209,232	99,980	109,252	169,245	96,753	72,492	39,987	3,227	36,760
B	702,439	494,332	208,107	546,656	445,738	100,918	155,783	48,594	107,189
A	1,803,383	1,204,016	599,367	1,395,486	1,096,173	299,313	407,897	107,843	300,054
Total	2,745,114	1,815,712	929,402	2,137,248	1,653,923	483,325	607,866	161,789	446,077
Central Coast:									
B, C, and D[3]	54,488	53,812	676	41,624	41,624		12,864	12,188	676
Northern Interior:									
D	13,945	112	13,833	10,307	86	10,221	3,638	26	3,612
C	109,678	5,022	104,656	84,226	5,022	79,204	25,452	--	25,452
B	443,986	272,970	171,016	344,840	233,621	111,219	99,146	39,347	59,797
A	1,082,658	1,006,596	76,062	831,550	794,066	37,484	251,108	212,530	38,578
Total	1,650,267	1,284,700	365,567	1,270,923	1,032,795	238,128	379,344	251,905	127,439
Sacramento:									
D	18,383	10,708	7,675	14,101	7,801	6,300	4,282	2,907	1,375
C	214,979	112,188	102,791	166,709	102,726	63,983	48,270	9,462	38,808
B	789,146	581,595	207,551	610,561	454,882	155,679	178,585	126,713	51,872
A	591,488	502,595	88,893	459,081	422,841	36,240	132,407	79,754	52,653
Total	1,613,996	1,207,086	406,910	1,250,452	988,250	262,202	363,544	218,836	144,708
San Joaquin:									
D	6,323	1,008	5,315	4,762	784	3,978	1,561	224	1,337
C	106,606	55,746	50,860	81,127	43,291	37,836	25,479	12,455	13,024
B	178,433	129,192	49,241	131,740	106,796	24,944	46,693	22,396	24,297
A	440,883	360,636	80,247	339,364	285,621	53,743	101,519	75,015	26,504
Total	732,245	546,582	185,663	556,993	436,492	120,501	175,252	110,090	65,162
Southern California. D and C[3]	34,207	34,204	3	26,649	26,647	2	7,558	7,557	1
All areas:									
D	68,711	29,212	39,499	55,031	23,930	31,101	13,680	5,282	8,398
C	674,702	307,140	367,562	527,956	274,439	253,517	146,746	32,701	114,045
B	2,168,492	1,531,901	636,591	1,675,421	1,282,661	392,760	493,071	249,240	243,831
A	3,918,412	3,073,843	844,569	3,025,481	2,598,701	426,780	892,931	475,142	417,789
Total	6,830,317	4,942,096	1,888,221	5,283,889	4,179,731	1,104,158	1,546,428	762,365	784,063

[1] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour sh ft, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

[2] Residues are not necessarily consumed in the economic area in which they were produced.

[3] Combined to avoid disclosure.

Table 29.--Production and disposition of wood residues by sawmills l

(Tor

Resource area and mill-size class[1/]	All types						
	Total	Total used[2/]	Pulp	Board	Fuel	Other	Unus
North Coast:							
D	25,861	15,259	8,151	3,099	121	3,888	10
C	169,245	96,753	55,067	13,153	8,891	19,642	72
B	546,656	445,738	286,260	60,786	48,502	50,190	100
A	1,395,486	1,096,173	537,405	229,499	276,918	52,351	299
Total	2,137,248	1,653,923	886,883	306,537	334,432	126,071	483
Central Coast: B, C, and D[4/]	41,624	41,624	1,531	--	2,105	37,988	
Northern Interior:							
D	10,307	86	--	--	62	24	1(
C	84,226	5,022	4,959	--	63	--	7
B	344,840	233,621	126,744	16,293	90,584	--	11
A	831,550	794,066	391,648	39,840	321,796	40,782	3
Total	1,270,923	1,032,795	523,351	56,133	412,505	40,806	23
Sacramento:							
D	14,101	7,801	5,821	--	960	1,020	
C	166,709	102,726	77,335	--	22,535	2,856	6
B	610,561	454,882	250,136	3,497	185,469	15,780	15
A	459,081	422,841	105,031	82,193	235,617	--	3
Total	1,250,452	988,250	438,323	85,690	444,581	19,656	26
San Joaquin:							
D	4,762	784	--	2	246	536	
C	81,127	43,291	21,506	8,256	1,952	11,577	
B	131,740	106,796	61,268	3,331	20,549	21,648	2
A	339,364	285,621	141,847	21,292	71,611	50,871	
Total	556,993	436,492	224,621	32,881	94,358	84,632	1
Southern California: C and D[4/]	26,649	26,647	--	2,121	90	24,436	
All areas:							
D	55,031	23,930	13,972	3,101	1,389	5,468	
C	527,956	274,439	158,867	23,530	33,531	58,511	2
B	1,675,421	1,282,661	725,939	83,907	347,209	125,606	3
A	3,025,481	2,598,701	1,175,931	372,824	905,942	144,004	4
Total	5,283,889	4,179,731	2,074,709	483,362	1,288,071	333,589	1,1

See footnotes at end of table.

lue, use, resource area, and mill-size class, California, 1972

		Coarse[3/]				
	Total used[2/]	Pulp	Board	Fuel	Other	Unused
27	12,864	8,151	3,099	121	1,493	3,063
03	52,068	44,707	3,289	4,072	--	55,935
27	314,595	245,236	8,532	21,996	38,831	32,332
71	723,213	505,072	39,470	126,320	52,351	155,758
28	1,102,740	803,166	54,390	152,509	92,675	247,088
47	26,247	1,531	--	2,105	22,611	--
52	61	--	--	45	16	6,501
50	4,959	4,959	--	--	--	47,201
77	167,910	126,744	3,697	37,469	--	27,067
50	441,079	384,532	11,288	8,791	36,468	271
49	614,009	516,235	14,985	46,305	36,484	81,040
56	7,119	5,821	--	960	338	1,647
19	78,475	75,183	--	436	2,856	13,644
01	295,487	244,302	--	39,779	11,406	45,414
05	251,892	93,238	82,193	76,461	--	913
31	632,973	418,544	82,193	117,636	14,600	61,618
12	451	--	2	246	203	3,061
50	29,142	21,506	1,690	--	5,946	19,408
02	59,507	57,299	430	--	1,778	12,095
39	167,484	141,847	10,441	15,196	--	29,415
53	256,584	220,652	12,563	15,442	7,927	63,979
35	14,385	--	1,144	90	13,151	--
67	20,495	13,972	3,101	1,372	2,050	14,272
17	179,029	146,355	6,123	4,598	21,953	136,188
34	863,746	675,112	12,659	101,349	74,626	116,908
25	1,583,668	1,124,689	143,392	226,768	88,819	186,357
53	2,646,938	1,960,128	165,275	334,087	187,448	453,725

Table 29.--Production and disposition of wood residues by sawmills by type of i

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Resource area and mill-size class[1]	Shavings						
	Total	Total used[2]	Pulp	Board	Fuel	Other	Unus
North Coast:							
D	3,122	656	--	--	--	656	2
C	16,405	11,411	1,286	8,100	1,004	1,021	4
B	60,472	52,689	7,834	32,078	7,804	4,973	7
A	193,150	152,674	6,031	110,008	36,635	--	40
Total	273,149	217,430	15,151	150,186	45,443	6,650	55
Central Coast: B, C, and D[4]	3,844	3,844	--	--	--	3,844	
Northern Interior:							
D	200	--	--	--	--	--	
C	9,333	--	--	--	--	--	9
B	56,062	32,174	--	12,596	19,578	--	23
A	143,726	134,968	7,116	28,552	94,986	4,314	8
Total	209,321	167,142	7,116	41,148	114,564	4,314	42
Sacramento:							
D	1,679	91	--	--	--	91	1
C	27,722	24,135	2,152	--	21,983	--	
B	96,810	73,053	5,834	3,497	59,348	4,374	2
A	77,683	72,037	11,793	--	60,244	--	
Total	203,894	169,316	19,779	3,497	141,575	4,465	3
San Joaquin:							
D	6	4	--	--	--	4	
C	8,350	2,277	--	--	1,952	325	
B	15,213	14,452	3,969	2,901	3,965	3,617	
A	46,392	46,015	--	8,463	19,699	17,853	
Total	69,961	62,748	3,969	11,364	25,616	21,799	
Southern California: C and D[4]	4,867	4,867	--	389	--	4,478	
All areas:							
D	5,007	751	--	--	--	751	
C	66,677	42,690	3,438	8,489	24,939	5,824	2
B	232,401	176,212	17,637	51,072	90,695	16,808	5
A	460,951	405,694	24,940	147,023	211,564	22,167	5
Total	765,036	625,347	46,015	206,584	327,198	45,550	1

[1] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = ,000 119,999, C = 40,000-79,999, D = less than 40,000.

[2] Not necessarily used in the economic area in which produced.

[3] Slabs, edgings, trim, and spur ends.

[4] Combined to avoid disclosure.

source area, and mill-size class, California, 1972--Continued

	Sawdust					
1	Total used[2/]	Pulp	Board	Fuel	Other	Unused
812	1,739	--	--	--	1,739	5,073
837	33,274	9,074	1,764	3,815	18,621	11,563
257	78,454	33,190	20,176	18,702	6,386	60,803
365	220,286	26,302	80,021	113,963	--	103,079
271	333,753	68,566	101,961	136,480	26,746	180,518
533	11,533	--	--	--	11,533	--
545	25	--	--	17	8	3,520
733	63	--	--	63	--	22,670
301	33,537	--	--	33,537	--	60,264
474	218,019	--	--	218,019	--	28,455
553	251,644	--	--	251,636	8	114,909
656	591	--	--	--	591	3,065
868	116	--	--	116	--	46,752
850	86,342	--	--	86,342	--	86,508
593	98,912	--	--	98,912	--	29,681
967	185,961	--	--	185,370	591	166,006
244	329	--	--	--	329	915
227	11,872	--	6,566	--	5,306	12,355
325	32,837	--	--	16,584	16,253	12,088
073	72,122	--	2,388	36,716	33,018	23,951
469	117,160	--	8,954	53,300	54,906	49,309
397	7,395	--	588	--	6,807	2
257	2,684	--	--	17	2,667	12,573
062	52,720	9,074	8,918	3,994	30,734	93,342
366	242,703	33,190	20,176	155,165	34,172	219,663
505	609,339	26,302	82,409	467,610	33,018	185,166
190	907,446	68,566	111,503	626,786	100,591	510,744

Table 30.--*Production and disposition of bark residue by sawmills by use, resource area, and mill-size class, California, 1972*

(Tons, dry weight)

Resource area and mill-size class[1/]	All bark	Used[2/]					Unused
		Total	Pulp	Board	Fuel	Miscellaneous	
North Coast:							
D	4,199	2,125	--	--	--	2,125	2,074
C	39,987	3,227	--	--	3,227	--	36,760
B	155,783	48,594	--	--	24,028	24,566	107,189
A	407,897	107,843	--	--	78,286	29,557	300,054
Total	607,866	161,789	--	--	105,541	56,248	446,077
Central Coast:							
B, C, and D[3/]	12,864	12,188	--	--	--	12,188	676
Northern Interior:							
D	3,638	26	--	--	17	9	3,612
C	25,452	--	--	--	--	--	25,452
B	99,146	39,349	--	--	25,312	14,037	59,797
A	251,108	212,530	--	--	150,071	62,459	38,578
Total	379,344	251,905	--	--	175,400	76,505	127,439
Sacramento:							
D	4,282	2,907	--	--	--	2,907	1,375
C	48,270	9,462	--	--	--	9,462	38,808
B	178,585	126,713	--	--	44,698	82,015	51,872
A	132,407	79,754	--	--	34,744	45,010	52,653
Total	363,544	218,836	--	--	79,442	139,394	144,708
San Joaquin:							
D	1,561	224	--	--	137	87	1,337
C	25,479	12,455	--	--	--	12,455	13,024
B	46,693	22,396	--	--	3,980	18,416	24,297
A	101,519	75,015	--	--	1,715	73,300	26,504
Total	175,252	110,090	--	--	5,832	104,258	65,162
Southern California:							
C and D[3/]	7,558	7,557	--	--	48	7,509	1
All areas:							
D	13,680	5,282	--	--	154	5,128	8,398
C	146,746	32,701	--	--	3,275	29,426	114,045
B	493,071	249,240	--	--	98,018	151,222	243,831
A	892,931	475,142	--	--	264,816	210,326	417,789
Total	1,546,428	762,365	--	--	366,263	396,102	784,063

[1/] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

[2/] Not necessarily used in the resource area in which produced.

[3/] Combined to avoid disclosure.

Table 31.--Production and disposition of wood and bark residues by sawmills by resource area and county, California, 1972

(Tons, dry weight)

Resource area and county	All residues			Wood residue			Bark residue		
	Total	Used[1]	Unused	Total	Used[1]	Unused	Total	Used[1]	Unused
North Coast:									
Del Norte	218,100	117,826	100,274	176,010	117,826	58,184	42,090	--	42,090
Humboldt	1,577,003	1,164,664	412,339	1,220,592	1,060,465	160,127	356,411	104,199	252,212
Mendocino	783,293	442,967	340,326	612,532	415,849	196,683	170,761	27,118	143,643
Sonoma	166,718	90,255	76,463	128,114	59,783	68,331	38,604	30,472	8,132
Total	2,745,114	1,815,712	929,402	2,137,248	1,653,923	483,325	607,866	161,789	446,077
Central Coast:									
Monterey and Santa Cruz[2]	54,488	53,812	676	41,624	41,624	--	12,864	12,188	676
Northern Interior:									
Lassen	221,507	165,106	56,401	171,991	127,195	44,796	49,516	37,911	11,605
Modoc	62,583	24,400	38,183	49,397	19,104	30,293	13,186	5,296	7,890
Shasta	471,499	375,157	96,342	356,245	290,412	65,833	115,254	84,745	30,509
Siskiyou	649,300	561,755	87,545	503,367	456,234	47,133	145,933	105,521	40,412
Trinity	245,378	158,282	87,096	189,923	139,850	50,073	55,455	18,432	37,023
Total	1,650,267	1,284,700	365,567	1,270,923	1,032,795	238,128	379,344	251,905	127,439
Sacramento:									
Butte	187,484	102,131	85,353	145,775	96,362	49,413	41,709	5,769	35,940
El Dorado	216,852	191,141	25,711	167,765	150,268	17,497	49,087	40,873	8,214
Glenn, Lake, and Tehama[2]	341,062	267,273	73,789	263,998	220,634	43,364	77,064	46,639	30,425
Placer and Nevada[2]	290,497	222,731	67,766	224,008	167,724	56,284	66,489	55,007	11,482
Plumas and Sierra[2]	388,891	280,803	108,088	302,719	235,349	67,370	86,172	45,454	40,718
Yuba	189,210	143,007	46,203	146,187	117,913	28,274	43,023	25,094	17,929
Total	1,613,996	1,207,086	406,910	1,250,452	988,250	262,202	363,544	218,836	144,708
San Joaquin:									
Calaveras and Amador[2]	154,210	117,598	36,612	118,424	94,600	23,824	35,786	22,998	12,788
Fresno	101,509	71,592	29,917	76,223	55,969	20,254	25,286	15,623	9,663
Madera and Mariposa[2]	84,425	56,993	27,432	58,553	43,824	14,729	25,872	13,169	12,703
Tulare and Kern[2]	218,694	169,663	49,031	170,482	136,554	33,928	48,212	33,108	15,104
Tuolumne	173,407	130,736	42,671	133,311	105,545	27,766	40,096	25,191	14,905
Total	732,245	546,582	185,663	556,993	436,492	120,501	175,252	110,090	65,162
Southern California:									
San Bernardino and San Diego[2]	34,207	34,204	3	26,649	26,647	2	7,558	7,557	1
All areas	6,830,317	4,942,096	1,888,221	5,283,889	4,179,731	1,104,158	1,546,428	762,365	784,063

[1] Not necessarily used in the economic area in which produced.

[2] Combined to avoid disclosure.

Table 32.--Production and disposition of wood residues by sawmills

Resource area and county	All types						U
	Total	Total used[1/]	Pulp	Board	Fuel	Other	
North Coast:							
Del Norte	176,010	117,826	86,282	14,208	1,617	15,719	
Humboldt	1,220,592	1,060,465	679,903	114,011	174,564	91,987	1
Mendocino	612,532	415,849	116,159	130,666	154,179	14,845	1
Sonoma	128,114	59,783	4,539	47,652	4,072	3,520	
Total	2,137,248	1,653,923	886,883	306,537	334,432	126,071	4
Central Coast:							
Monterey and Santa Cruz[3/]	41,624	41,624	1,531	--	2,105	37,988	
Northern Interior:							
Lassen	171,991	127,195	70,268	7,493	49,434	--	
Modoc	49,397	19,104	--	--	19,104	--	
Shasta	356,245	290,412	104,104	23,470	126,346	36,492	
Siskiyou	503,367	456,234	257,310	14,959	183,965	--	
Trinity	189,923	139,850	91,669	10,211	33,656	4,314	
Total	1,270,923	1,032,795	523,351	56,133	412,505	40,806	
Sacramento:							
Butte	145,775	96,362	10,568	--	85,403	391	
El Dorado	167,765	150,268	64,049	486	84,974	759	
Glenn, Lake, and Tehama[3/]	263,998	220,634	61,181	42,452	105,595	11,406	
Placer and Nevada[3/]	224,008	167,724	126,784	3,011	33,717	4,212	
Plumas and Sierra[3/]	302,719	235,349	103,738	39,741	91,870	--	
Yuba	146,187	117,913	72,003	--	43,022	2,888	
Total	1,250,452	988,250	438,323	85,690	444,581	19,656	
San Joaquin:							
Calaveras and Amador[3/]	118,424	94,600	56,165	7,737	26,513	4,185	
Fresno	76,223	55,969	35,153	8,256	7,749	4,811	
Madera and Mariposa[3/]	58,553	43,824	24,862	3,331	10,056	5,575	
Tulare and Kern[3/]	170,482	136,554	55,061	13,557	8,795	59,141	
Tuolumne	133,311	105,545	53,380	--	41,245	10,920	
Total	556,993	436,492	224,621	32,881	94,358	84,632	
Southern California:							
San Bernardino and San Diego[3/]	26,649	26,647	--	2,121	90	24,436	
All areas	5,283,889	4,179,731	2,074,709	483,362	1,288,071	333,589	1,4

See footnotes at end of table.

e, use, resource area, and county, California, 1972

		Coarse[2/]				
	Total used[1/]	Pulp	Board	Fuel	Other	Unused
12	76,399	76,399	--	--	--	40,513
38	743,079	606,069	10,128	45,790	81,092	37,659
87	267,806	116,159	37,874	102,647	11,126	107,481
91	15,456	4,539	6,388	4,072	457	61,435
28	1,102,740	803,166	54,390	152,509	92,675	247,088
47	26,247	1,531	--	2,105	22,611	--
66	70,283	70,268	--	15	--	23,883
04	10,147	--	--	10,147	--	15,257
53	158,856	96,988	14,985	10,399	36,484	28,697
99	274,623	257,310	--	17,313	--	7,276
27	100,100	91,669	--	8,431	--	5,927
49	614,009	516,235	14,985	46,305	36,484	81,040
80	73,090	8,416	--	64,403	271	7,490
73	87,237	64,049	--	23,136	52	5,736
76	123,648	49,388	42,452	20,402	11,406	22,728
85	120,950	120,950	--	--	--	5,435
52	148,496	103,738	39,741	5,017	--	17,156
25	79,552	72,003	--	4,678	2,871	3,073
91	632,973	418,544	82,193	117,636	14,600	61,618
89	62,792	56,165	1,657	4,970	--	10,497
04	33,077	31,184	1,690	--	203	14,827
60	25,531	24,862	430	239	—	5,429
66	71,578	55,061	8,786	7	7,724	20,988
44	63,606	53,380	--	10,226	--	12,238
63	256,584	220,652	12,563	15,442	7,927	63,979
85	14,385	--	1,144	90	13,151	--
63	2,646,938	1,960,128	165,275	334,087	187,448	453,725

Table 32.--Production and disposition of wood residues by sawmills by

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Resource area and county	Shavings						U
	Total	Total used[1/]	Pulp	Board	Fuel	Other	
North Coast:							
Del Norte	15,050	14,208	--	14,208	--	--	
Humboldt	149,584	123,355	15,151	62,996	39,450	5,758	2
Mendocino	89,496	63,235	--	57,242	5,993	--	2
Sonoma	19,019	16,632	--	15,740	--	892	
Total	273,149	217,430	15,151	150,186	45,443	6,650	5
Central Coast:							
Monterey and Santa Cruz[3/]	3,844	3,844	--	--	--	3,844	
Northern Interior:							
Lassen	29,505	26,007	--	7,493	18,514	--	
Modoc	11,224	3,772	--	--	3,772	--	
Shasta	60,170	46,807	7,116	8,485	31,206	--	
Siskiyou	78,141	62,414	--	14,959	47,455	--	
Trinity	30,281	28,142	--	10,211	13,617	4,314	
Total	209,321	167,142	7,116	41,148	114,564	4,314	
Sacramento:							
Butte	25,074	17,502	2,152	--	15,324	26	
El Dorado	26,933	21,310	--	486	20,597	227	
Glenn, Lake, and Tehama[3/]	42,634	42,468	11,793	--	30,675	--	
Placer and Nevada[3/]	33,435	24,352	5,834	3,011	11,295	4,212	
Plumas and Sierra[3/]	53,610	43,511	--	--	43,511	--	
Yuba	22,208	20,173	--	--	20,173	--	
Total	203,894	169,316	19,779	3,497	141,575	4,465	
San Joaquin:							
Calaveras and Amador[3/]	12,904	11,059	--	4,424	6,635	--	
Fresno	3,975	3,973	3,969	--	--	4	
Madera and Mariposa[3/]	2,960	2,960	--	2,901	59	--	
Tulare and Kern[3/]	31,558	26,569	--	4,039	5,858	16,672	
Tuolumne	18,564	18,187	--	--	13,064	5,123	
Total	69,961	62,748	3,969	11,364	25,616	21,799	
Southern California:							
San Bernardino and San Diego[3/]	4,867	4,867	--	389	--	4,478	
All areas	765,036	625,347	46,015	206,584	327,198	45,550	

[1/] Not necessarily used in the resource area in which produced.

[2/] Slabs, edging, trim, and spur ends.

[3/] Combined to avoid disclosure.

use, resource area, and county, California, 1972--Continued

	Sawdust					
	Total used[1/]	Pulp	Board	Fuel	Other	Unused
148	27,219	9,883	--	1,617	15,719	16,829
170	194,031	58,683	40,887	89,324	5,137	96,239
149	84,808	--	35,550	45,539	3,719	62,941
104	27,695	--	25,524	--	2,171	4,509
171	333,753	68,566	101,961	136,480	26,746	180,518
133	11,533	--	--	--	11,533	--
120	30,905	--	--	30,905	--	17,415
169	5,185	--	--	5,185	--	7,584
122	84,749	--	--	84,741	8	23,773
127	119,197	--	--	119,197	--	24,130
115	11,608	--	--	11,608	--	42,007
553	251,644	--	--	251,636	8	114,909
121	5,770	--	--	5,676	94	34,351
159	41,721	--	--	41,241	480	6,138
188	54,518	--	--	54,518	--	20,470
188	22,422	--	—	22,422	--	41,766
157	43,342	--	--	43,342	--	40,115
154	18,188	--	--	18,171	17	23,166
167	185,961	--	--	185,370	591	166,006
131	20,749	--	1,656	14,908	4,185	11,482
144	18,919	--	6,566	7,749	4,604	5,425
133	15,333	--	--	9,758	5,575	9,300
158	38,407	--	732	2,930	34,745	7,951
103	23,752	--	—	17,955	5,797	15,151
159	117,160	--	8,954	53,300	54,906	49,309
197	7,395	--	588	--	6,807	2
190	907,446	68,566	111,503	626,786	100,591	510,744

Table 33.--*Production and disposition of bark residue by sawmills by use, resource area, and county, California, 1972*

(Tons, dry weight)

Resource area and county	All bark	Used[1/]					Unused
		Total	Pulp	Board	Fuel	Miscellaneous	
North Coast:							
Del Norte	42,090	--	--	--	--	--	42,090
Humboldt	356,411	104,199	--	--	83,195	21,004	252,212
Mendocino	170,761	27,118	--	--	22,346	4,772	143,643
Sonoma	38,604	30,472	--	--	--	30,472	8,132
Total	607,866	161,789	--	--	105,541	56,248	446,077
Central Coast:							
Monterey and Santa Cruz[2/]	12,864	12,188	--	--	--	12,188	676
Northern Interior:							
Lassen	49,516	37,911	--	--	--	37,911	11,605
Modoc	13,186	5,296	--	--	5,296	--	7,890
Shasta	115,254	84,745	--	--	74,491	10,254	30,509
Siskiyou	145,933	105,521	--	--	95,613	9,908	40,412
Trinity	55,455	18,432	--	--	--	18,432	37,023
Total	379,344	251,905	--	--	175,400	76,505	127,439
Sacramento:							
Butte	41,709	5,769	--	--	5,679	90	35,940
El Dorado	49,087	40,873	--	--	22,075	18,798	8,214
Glenn, Lake, and Tehama[2/]	77,064	46,639	--	--	3,234	43,405	30,425
Placer and Nevada[2/]	66,489	55,007	--	--	14,223	40,784	11,482
Plumas and Sierra[2/]	86,172	45,454	--	--	23,586	21,868	40,718
Yuba	43,023	25,094	--	--	10,645	14,449	17,929
Total	363,544	218,836	--	--	79,442	139,394	144,708
San Joaquin:							
Calaveras and Amador[2/]	35,786	22,998	--	--	1,715	21,283	12,788
Fresno	25,286	15,623	--	--	3,980	11,643	9,663
Madera and Mariposa[2/]	25,872	13,169	--	--	134	13,035	12,703
Tulare and Kern[2/]	48,212	33,109	--	--	3	33,106	15,103
Tuolumne	40,096	25,191	--	--	--	25,191	14,905
Total	175,252	110,090	--	--	5,832	104,258	65,162
Southern California:							
San Bernardino and San Diego[2/]	7,558	7,557	--	--	48	7,509	1
All areas	1,546,428	762,365	--	--	366,263	396,102	784,063

[1/] Not necessarily used in the resource area in which produced.

[2/] Combined to avoid disclosure.

Table 34.--Lumber production by sawmills by degree of manufacture, resource area, and mill-size class, California, 1972

(Thousand board feet, lumber tally.)

Resource area and mill-size class[1/]	Green	Kiln-dried	Air-dried	Total	Rough	Surfaced	Remanufactured
North Coast:							
D	26,894	632	--	27,526	11,726	15,168	632
C	144,155	15,112	17,109	176,376	84,782	91,594	--
B	410,552	82,977	38,848	532,377	172,862	356,610	2,905
A	1,064,773	297,866	18,841	1,381,480	344,727	1,014,544	22,209
Total	1,646,374	396,587	74,798	2,117,759	614,097	1,477,916	25,746
Central Coast:							
B, C, and D[2/]	43,742	—	578	44,320	24,405	19,915	--
Northern Interior:							
D	12,056	--	699	12,755	11,735	1,020	--
C	36,410	6,462	44,759	87,631	58,434	29,197	--
B	101,030	220,837	23,517	345,384	65,848	279,536	--
A	252,336	596,831	29,981	879,148	140,215	732,362	6,571
Total	401,832	824,130	98,956	1,324,918	276,232	1,042,115	6,571
Sacramento:							
D	7,845	6,000	490	14,335	4,975	9,210	150
C	74,965	87,854	6,259	169,078	31,525	137,553	--
B	191,087	361,325	72,700	625,112	143,078	473,834	8,200
A	37,945	417,451	8,400	463,796	77,971	385,825	--
Total	311,842	872,630	87,849	1,272,321	257,549	1,006,422	8,350
San Joaquin:							
D	5,178	--	82	5,260	5,230	30	--
C	22,360	53,150	13,340	88,850	46,400	42,450	--
B	48,432	75,599	40,670	164,701	81,802	82,899	--
A	67,963	186,470	99,238	353,671	123,188	225,183	5,300
Total	143,933	315,219	153,330	612,482	256,620	350,562	5,300
Southern California:							
C and D[2/]	13,173	10,538	2,805	26,516	2,541	23,711	264
All areas:							
D	51,973	6,632	1,271	59,876	33,666	25,428	782
C	291,063	173,116	84,272	548,451	223,682	324,505	264
B	794,843	740,738	176,313	1,711,394	487,995	1,212,794	11,105
A	1,423,017	1,498,618	156,460	3,078,095	686,101	2,357,914	34,080
Total	2,560,896	2,419,104	418,316	5,398,316	1,431,444	3,920,641	46,231

[1/] Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

[2/] Combined to avoid disclosure.

Table 35.--*Lumber production by sawmills by mill-size class and resource area, California, 1972*

(Thousand board feet, lumber tally)

Resource area	All classes	Mill-size class[1/]			
		D	C	B	A
North Coast	2,117,759	27,526	176,376	532,377	1,381,480
Central Coast	44,320	(2/)	(2/)	44,320	--
Northern Interior	1,324,918	12,755	87,631	345,384	879,148
Sacramento	1,272,321	14,335	169,078	625,112	463,796
San Joaquin	612,482	5,260	88,850	164,701	353,671
Southern California	26,516	(3/)	26,516	--	--
All areas	5,398,316	59,876	548,451	1,711,894	3,078,095

1/ Mill-size classes are as follows: class A mills = 120,000+ board-foot capacity per 8-hour shift, B = 80,000-119,999, C = 40,000-79,999, D = less than 40,000.

2/ Combined with mill-size class B to avoid disclosure for Central Coast.

3/ Combined with mill-size class C to avoid disclosure for southern California.

Table 36.--*Number of veneer and plywood mills by type of mill, resource area, and county, California, 1972*

Resource area and county	All types	Veneer only	Layup only	Veneer and layup
North Coast:				
Del Norte	4	3	--	1
Humboldt	9	4	--	5
Mendocino	1	--	--	1
Sonoma	1	--	--	1
Total	15	7	--	8
Northern Interior:				
Shasta	2	--	--	2
Siskiyou	3	2	--	1
Total	5	2	--	3
Sacramento:				
El Dorado	1	1	--	--
Nevada	1	1	--	--
Tehama	1	--	--	1
Total	3	2	--	1
San Joaquin:				
Amador	1	--	--	1
Tuolumne	1	--	--	1
Total	2	--	--	2
All areas	25	11	--	14

Table 37.--*Installed 8-hour capacity of veneer and plywood mills by type of mill, resource area, and county, California, 1972*

(Thousand square feet, 3/8-inch basis)

Resource area and county	Veneer only	Veneer and layup
North Coast:		
Del Norte	800	120
Humboldt	459	717
Mendocino	--	142
Sonoma	--	120
Total	1,259	1,099
Northern Interior:		
Shasta	--	315
Siskiyou	650	155
Total	650	470
Sacramento:		
El Dorado	50	--
Nevada	50	--
Tehama	--	130
Total	100	130
San Joaquin:		
Amador	--	165
Tuolumne	--	100
Total	--	265
All areas	2,009	1,964

Table 38.--*Number of veneer and plywood mills by lathe log diameter limit and resource area, California, 1972*

Resource area	Lathe log diameter (inches)							
	Layup only	20-29	30-39	40-49	50-59	60-69	70-79	80+
North Coast	--	--	--	--	--	1	5	9
Northern Interior	--	--	--	--	--	1	1	3
Sacramento	--	--	--	1	--	2	--	--
San Joaquin	--	--	--	--	--	--	1	1
All areas	--	--	--	1	--	4	7	13

Table 39.--*Number of veneer and plywood mills by size of core produced and resource area, California, 1972*

Resource area	Diameter of cores (inches)							
	3	4	5	6	7	8	9	10+
North Coast	--	--	1	2	2	3	2	5
Northern Interior	--	--	--	--	2	2	1	--
Sacramento	--	--	--	2	1	--	--	--
San Joaquin	--	--	--	1	--	--	--	1
All areas	--	--	1	5	5	5	3	6

Table 40.--*Number of veneer and plywood mills having selected equipment, by resource area and county, California, 1972*

Resource area and county	4-foot lathe	8-foot lathe	Slicer	Veneer chipper	Core chipper	Cold press	Hot press	Burner
North Coast:								
Del Norte	1	4	--	4	4	--	1	3
Humboldt	3	9	1	8	2	--	5	5
Mendocino	--	1	--	1	--	--	1	--
Sonoma	1	1	--	1	--	--	1	1
Total	5	15	1	14	6	--	8	9
Northern Interior:								
Shasta	1	2	1	1	--	--	2	1
Siskiyou	1	3	1	2	1	--	1	1
Total	2	5	2	3	1	--	3	2
Sacramento:								
El Dorado	1	--	--	1	--	--	--	1
Nevada	1	--	--	--	--	--	--	1
Tehama	--	1	--	1	1	--	1	--
Total	2	1	--	2	1	--	1	2
San Joaquin:								
Amador	--	1	--	1	1	--	1	--
Tuolumne	--	1	--	1	1	1	1	1
Total	--	2	--	2	2	1	2	1
All areas	9	23	3	21	10	1	14	14

Table 41.--*Number of veneer and plywood mills by years of tenure of present mill ownership, resource area, and years at site, California, 1972*

Resource area and years at site	All mills	Tenure of present mill ownership (years)				
		0-2	3-5	6-10	11-20	21+
North Coast:						
3 - 5	2	--	2	--	--	--
6 - 10	2	--	--	2	--	--
11 - 20	7	1	--	1	5	--
21+	4	1	1	1	1	--
Total	15	2	3	4	6	--
Northern Interior:						
3 - 5	1	--	1	--	--	--
6 - 10	1	--	--	1	--	--
11 - 20	1	--	--	--	1	--
21+	2	--	--	--	1	1
Total	5	--	1	1	2	1
Sacramento:						
3 - 5	1	--	1	--	--	--
11 - 20	2	--	--	1	1	--
Total	3	--	1	1	1	--
San Joaquin:						
11 - 20	2	--	1	1	--	--
All areas:						
3 - 5	4	--	4	--	--	--
6 - 10	3	--	--	3	--	--
11 - 20	12	1	1	3	7	--
21+	6	1	1	1	2	1
Total	25	2	6	7	9	1

Table 42.--*Average number of operating days of veneer and plywood mills by type of mill and resource area, California, 1972*

Resource area	Veneer only	Veneer and layup
North Coast	235	247
Northern Interior	278	243
Sacramento	230	260
San Joaquin	--	253
All areas	242	248

Table 43.--*Log consumption by veneer and plywood mills by type of material and resource area, California, 1972*

(Thousand board feet, local scale)

Resource area	Total roundwood	Sound logs		Utility logs
		Live	Dead	
North Coast	393,290	327,009	45,554	20,727
Northern Interior	150,565	140,943	1,500	8,122
Sacramento and San Joaquin[1/]	101,253	100,912	341	--
All areas	645,108	568,864	47,395	28,849

[1/] Combined to avoid disclosure.

Table 44.--*Log consumption by veneer and plywood mills by timber age group and resource area, California, 1972*

(Thousand board feet, local scale)

Resource area	All age groups	Old growth (100+ years)	Young growth (less than 100 years)
North Coast	393,290	335,245	58,045
Northern Interior	150,565	136,037	14,528
Sacramento and San Joaquin[1/]	101,253	85,897	15,356
All areas	645,108	557,179	87,929

[1/] Combined to avoid disclosure.

Table 45.--*Log inventory changes, log consumption, and apparent log receipts of veneer and plywood mills by resource area, California, 1972*

(Thousand board feet, local scale)

Resource area	Log inventory			1972 log consumption	Apparent 1972 log receipts
	January 1, 1972	December 31, 1972	Net change		
North Coast	62,210	70,908	8,698	393,290	401,988
Northern Interior	47,026	50,787	3,761	150,565	154,326
Sacramento and San Joaquin[1/]	70,849	69,803	-1,046	101,253	100,207
All areas	180,085	191,498	11,413	645,108	656,521

[1/] Combined to avoid disclosure.

Table 46.--Log consumption of veneer and plywood mills by ownership class and resource area, California, 1972

(Thousand board feet, local scale)

Resource area	All owners	National Forest	State	Bureau of Land Management	Other public	Forest industry		Farmer and miscellaneous private
						Own wood supply	Other wood supply	
North Coast	393,290	65,301	1,595	1,320	13,400	258,418	17,401	35,855
Northern Interior	150,565	90,234	--	1,638	--	18,116	30,007	10,570
Sacramento and San Joaquin[1/]	101,253	65,802	--	--	--	25,292	--	10,159
All areas	645,108	221,337	1,595	2,958	13,400	301,826	47,408	56,584

[1/] Combined to avoid disclosure.

Table 47.--Dependency of veneer and plywood mills for logs by ownership origin and resource area, California, 1972

(Number of mills)

Resource area	National Forest				State				Bureau of Land Management				Other public				Forest industry: Own wood supply				Forest industry: Other wood supply				Farmer and miscellaneous private			
	Dependency percent																											
	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100
North Coast	9	1	2	3	14	1	--	--	14	1	--	--	13	1	--	1	6	--	2	7	14	--	--	1	5	8	2	--
Northern Interior	--	1	2	2	5	--	--	--	4	1	--	--	5	--	--	--	2	2	1	--	3	1	1	--	2	3	--	--
Sacramento	--	1	2	--	3	--	--	--	3	--	--	--	3	--	--	--	1	1	1	--	3	--	--	--	1	--	1	1
San Joaquin	--	--	--	2	2	--	--	--	2	--	--	--	2	--	--	--	--	2	--	--	2	--	--	--	2	--	--	--
All areas	9	3	6	7	24	1	--	--	23	2	--	--	23	1	--	1	9	5	4	7	22	1	1	1	10	11	3	1

Table 48.--Log consumption by veneer and plywood mills by species, resource area, and type of material, California, 1972

(Thousand board feet, local scale)

Resource area and type of material	All species	Douglas-fir	Hemlock	True firs	Redwood	Ponderosa and sugar pines	Incense-cedar	Other softwoods	Hardwoods
North Coast:									
Sound	372,563	297,063	2,404	27,154	42,138	365	--	3,439	--
Utility	20,727	18,249	78	1,425	75	78	--	822	--
Total	393,290	315,312	2,482	28,579	42,213	443	--	4,261	--
Northern Interior:									
Sound	142,444	76,712	--	47,803	--	17,929	--	--	--
Utility	8,121	4,237	--	2,631	--	1,253	--	--	--
Total	150,565	80,949	--	50,434	--	19,182	--	--	--
Sacramento and San Joaquin:[1/]									
Sound	101,253	7,056	--	86,422	--	7,550	--	225	--
Utility	--	--	--	--	--	--	--	--	--
Total	101,253	7,056	--	86,422	--	7,550	--	225	--
All areas:									
Sound	616,260	380,831	2,404	161,379	42,138	25,844	--	3,664	--
Utility	28,848	22,486	78	4,056	75	1,331	--	822	--
Total	645,108	403,317	2,482	165,435	42,213	27,175	--	4,486	--

[1/] Combined to avoid disclosure.

Table 49.--Production and disposition of wood and bark residues by veneer and plywood mills, by resource area, California, 1972

(Tons, dry weight)

Resource area	All residues			Wood residue			Bark residue		
	Total	Used[1/]	Unused	Total	Used[1/]	Unused	Total	Used[1/]	Unused
North Coast	540,227	451,022	89,205	417,614	396,908	20,706	122,613	54,114	68,499
Northern Interior	168,311	154,793	13,518	139,577	137,190	2,387	28,734	17,603	11,131
Sacramento and San Joaquin[2/]	142,226	128,078	14,148	110,173	102,005	8,168	32,053	26,073	5,980
All areas	850,764	733,893	116,871	667,364	636,103	31,261	183,400	97,790	85,610

[1/] Not necessarily used in the resource area in which produced.

[2/] Combined to avoid disclosure.

Table 50.--Production and disposition of wood residue by veneer and plywood mills by type of residue, use, and resource area, California, 1972

(Tons, dry weight)

Resource area	All types						Coarse and medium[2/]						Fine[3/]					
	Total	Total used[1/]	Pulp and board	Fuel	Miscel-laneous	Unused	Total	Total used[1/]	Pulp and board	Fuel	Miscel-laneous	Unused	Total	Total used[1/]	Pulp and board	Fuel	Miscel-laneous	Unused
North Coast	417,614	396,908	301,068	57,718	38,122	20,706	404,023	386,218	300,413	49,993	35,812	17,805	13,591	10,690	655	7,725	2,310	2,901
Northern Interior	139,577	137,190	109,565	14,268	13,357	2,387	135,028	133,006	109,565	10,084	13,357	2,022	4,549	4,184	--	4,184	--	365
Sacramento and San Joaquin[4/]	110,173	102,005	85,353	14,959	1,693	8,168	105,388	98,892	85,014	12,185	1,693	6,496	4,785	3,113	339	2,774	--	1,672
All areas	667,364	636,103	495,986	86,945	53,172	31,261	644,439	618,116	494,992	72,262	50,862	26,323	22,925	17,987	994	14,683	2,310	4,938

[1/] Not necessarily used in the resource area in which produced.

[2/] Includes log trim, cores, veneer clippings, rejected veneer, roundup, and spur trim.

[3/] Includes sawdust and sander dust.

[4/] Combined to avoid disclosure.

Table 51.--*Production and disposition of bark residue by veneer and plywood mills by use and resource area, California, 1972*

(Tons, dry weight)

Resource area	All bark	Used[1/]				Unused
		Total	Pulp and board	Fuel	Other	
North Coast	122,613	54,114	--	54,114	--	68,499
Northern Interior	28,734	17,603	--	14,435	3,168	11,131
Sacramento and San Joaquin[2/]	32,053	26,073	--	1,064	25,009	5,980
All areas	183,400	97,790	--	69,613	28,177	85,610

[1/] Not necessarily used in the resource area in which produced.

[2/] Combined to avoid disclosure.

Table 52.--*Number of pulpmills and boardmills by type of operation, resource area, and county, California, 1972*

Resource area and county	All mills	Type of pulpmill				Type of boardmill	
		Sulfite	Sulfate	Groundwood[1/]	Semichemical	Hardboard	Particleboard
North Coast:							
Del Norte	1	--	--	--	--	--	1
Humboldt	3	--	2	--	--	--	1
Mendocino	2	--	--	--	--	1	1
Total	6	--	2	--	--	1	3
Central Coast:							
Contra Costa	4	--	1	2	1	--	--
Total	4	--	1	2	1	--	--
Northern Interior:							
Shasta	2	--	1	--	--	--	1
Total	2	--	1	--	--	--	1
Sacramento:							
Plumas	1	--	--	--	--	--	1
Tehama	1	--	--	1	--	--	--
Total	2	--	--	1	--	--	1
San Joaquin:							
Amador	1	--	--	--	--	--	1
Madera	1	--	--	--	--	--	1
Total	2	--	--	--	--	--	2
Southern California:							
Los Angeles	1	--	--	1	--	--	--
San Bernardino	1	--	--	--	--	--	1
Total	2	--	--	1	--	--	1
All areas	18	--	4	4	1	1	8

[1/] Includes three roofing-felt mills.

Table 53.--*Installed 24-hour capacity of pulpmills and board mills by type of mill, resource area, and county, California, 1972*

Resource area and county	Type of pulpmill			Type of boardmill	
	Sulfate	Groundwood 1/	Semichemical	Hardboard	Particleboard
	Tons, dry weight			*Thousand square feet (1/8-inch basis)*	*Thousand square feet (3/4-inch basis)*
North Coast:					
Del Norte	--	--	--	--	80
Humboldt	1,140	--	--	--	300
Mendocino	--	--	--	950	215
Total	1,140	--	--	950	595
Central Coast:					
Contra Costa	610	118	240	--	--
Total	610	118	240	--	--
Northern Interior:					
Shasta	150	--	--	--	225
Total	150	--	--	--	225
Sacramento:					
Plumas	--	--	--	--	120
Tehama	--	80	--	--	--
Total	--	80	--	--	120
San Joaquin:					
Amador	--	--	--	--	335
Madera	--	--	--	--	125
Total	--	--	--	--	460
Southern California:					
Los Angeles	--	260	--	--	--
San Bernardino	--	--	--	--	100
Total	--	260	--	--	100
All areas	1,900	458	240	950	1,500

1/ Includes three roofing-felt mills.

Table 54.--*Number of pulpmills and boardmills by years of tenure of present ownership, type of mill, and years at site, California, 1972*

Mill type and years at site	All mills	Tenure of present ownership (years)				
		0-2	3-5	6-10	11-20	21+
Sulfate:						
6 - 10	3	2	--	1	--	--
21+	1	--	--	--	--	1
Total	4	2	--	1	--	1
Groundwood:[1/]						
11 - 20	1	--	--	--	1	--
21+	3	--	--	--	--	3
Total	4	--	--	--	1	3
Semichemical:						
21+	1	--	--	--	--	1
Hardboard:						
21+	1	--	--	--	--	1
Particleboard:						
0 - 2	3	3	--	--	--	--
6 - 10	2	--	--	2	--	--
11 - 20	2	--	--	1	1	--
21+	1	--	--	--	--	1
Total	8	3	--	3	1	1
All mills:						
0 - 2	3	3	--	--	--	--
6 - 10	5	2	--	3	--	--
11 - 20	3	--	--	1	2	--
21+	7	--	--	--	--	7
Total	18	5	--	4	2	7

[1/] Includes two roofing-felt mills.

Table 55.--*Average number of operating days of pulpmills and boardmills by resource area, California, 1972*

Resource area	Pulp[1/]	Board
North Coast	351	308
Central Coast	352	--
Northern Interior	355	267
Sacramento	269	248
San Joaquin	--	[2/] 136
Southern California	360	[2/] 25
All areas	343	227

[1/] Includes three roofing-felt mills.

[2/] These low averages are the result of a new mill beginning operation late in the year and an existing mill being shut down for most of the year; thus these averages do not reflect the normal status of the industry in these two areas.

Table 56.--Wood consumption by pulpmills and boardmills by type of material consumed and resource area, California, 1972

Resource area	Roundwood				Other				
	Total	Sound logs		Utility logs	Total	Chips		Sawdust	Shavings and bark
		Live	Dead			From mill residue	From other sources		
	Thousand board feet, local scale				*Tons, dry weight*				
North Coast	6,000	--	--	6,000	1,443,883	1,134,070	--	98,644	211,169
Central Coast	14,077	--	--	14,077	494,638	339,254	152,000	3,384	--
Northern Interior and Sacramento[1/]	--	--	--	--	306,016	237,594	--	10,308	58,114
San Joaquin and Southern California[1/]	--	--	--	--	75,470	23,562	--	13,964	37,944
All areas	20,077	--	--	20,077	2,320,007	1,734,480	152,000	126,300	307,227

[1/] Combined to avoid disclosure.

Table 57.--*Log consumption by pulpmills and boardmills by timber age group and resource area, California, 1972*

(Thousand board feet, local scale)

Resource area	All age groups	Old growth (100+ years)	Young growth (less than 100 years)
North Coast	6,000	6,000	--
Central Coast	14,077	14,077	--
All areas	20,077	20,077	--

Table 58.--*Log consumption of pulpmills and boardmills by ownership class and resource area, California, 1972*

(Thousand board feet, local scale)

Resource area	All owners	National Forest	State	Forest industry		Farmer and miscellaneous private
				Own wood supply	Other wood supply	
North Coast	6,000	--	--	6,000	--	--
Central Coast	14,077	--	--	7,742	6,335	--
All areas	20,077	--	--	13,742	6,335	--

Table 59.--Dependency of pulpmills and boardmills for logs by ownership origin and resource area, California, 1972

(Number of mills)

Resource area	National Forest				State				Forest industry								Farmer and miscellaneous private			
									Own wood supply				Other wood supply							
	Dependency percent																			
	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100
North Coast	6	--	--	--	6	--	--	--	5	--	--	1	6	--	--	--	6	--	--	--
Central Coast	4	--	--	--	4	--	--	--	2	--	2	--	2	--	2	--	4	--	--	--
All areas	10	--	--	--	10	--	--	--	7	--	2	1	8	--	2	--	10	--	--	--

Table 60.--Log consumption by pulpmills and boardmills by species, resource area, and type of material, California, 1972

(Thousand board feet, local scale)

Resource area and type of material	All species	Douglas-fir	Hemlock	True firs	Redwood	Ponderosa and sugar pines	Incense-cedar	Other softwoods	Hardwoods
North Coast:									
Sound	--	--	--	--	--	--	--	--	--
Utility	6,000	3,600	--	--	2,400	--	--	--	--
Total	6,000	3,600	--	--	2,400	--	--	--	--
Central Coast:									
Sound	--	--	--	--	--	--	--	--	--
Utility	14,077	9,150	--	4,927	--	--	--	--	--
Total	14,077	9,150	--	4,927	--	--	--	--	--
All areas:									
Sound	--	--	--	--	--	--	--	--	--
Utility	20,077	12,750	--	4,927	2,400	--	--	--	--
Total	20,077	12,750	--	4,927	2,400	--	--	--	--

Table 61.--*Pulpmill and boardmill consumption of mill residues and chips from other sources by State, resource area, and type of material, California, 1972*

(Tons, dry weight)

Resource area and type of material	Total volume	California	Oregon
North Coast:			
Chip residue	1,134,070	1,079,710	54,360
Chips, other sources	--	--	--
Sawdust	98,644	98,644	--
Shavings and bark	211,169	198,874	12,295
Total	1,443,883	1,377,228	66,655
Central Coast:			
Chip residue	339,254	339,254	--
Chips, other sources	152,000	152,000	--
Sawdust	3,384	3,384	--
Shavings and bark	--	--	--
Total	494,638	494,638	--
Northern Interior and Sacramento: 1/			
Chip residue	237,594	237,594	--
Chips, other sources	--	--	--
Sawdust	10,308	10,308	--
Shavings and bark	58,114	58,114	--
Total	306,016	306,016	--
San Joaquin and Southern California: 1/			
Chip residue	23,562	23,562	--
Chips, other sources	--	--	--
Sawdust	13,964	13,964	--
Shavings and bark	37,944	37,944	--
Total	75,470	75,470	--
All areas:			
Chip residue	1,734,480	1,680,120	54,360
Chips, other sources	152,000	152,000	--
Sawdust	126,300	126,300	--
Shavings and bark	307,227	294,932	12,295
Total	2,320,007	2,253,352	66,655

1/ Combined to avoid disclosure.

Table 62.--*Number of "other industry" mills by type of industry, resource area, and county, California, 1972*

Resource area and county	All types	Shake and shingle	Export	Post, pole, and piling
North Coast:				
Del Norte	1	1	--	--
Humboldt	5	1	4	--
Mendocino	5	5	--	--
Sonoma	1	--	--	1
Total	12	7	4	1
Northern Interior:				
Siskiyou	1	--	--	1
Total	1	--	--	1
Sacramento:				
Butte	1	--	--	1
Sacramento	1	--	1	--
Total	2	--	1	1
San Joaquin:				
Madera	1	--	--	1
San Joaquin	2	--	1	1
Total	3	--	1	2
Southern California:				
Los Angeles	1	--	--	1
Total	1	--	--	1
All areas	19	7	6	6

Table 63.--*Installed capacity of "other industry" mills by resource area and county, California, 1972*

Resource area and county	Shake and shingle (8-hour shift)	Post, pole, and piling (yearly)
	Squares	*Thousand board feet, local scale*
North Coast:		
Del Norte	80	--
Humboldt	25	--
Mendocino	107	--
Sonoma	--	16,250
Total	212	16,250
Northern Interior:		
Siskiyou	--	4,500
Total	--	4,500
Sacramento:		
Butte	--	7,315
Total	--	7,315
San Joaquin:		
Madera	--	1,800
San Joaquin	--	16,425
Total	--	18,225
Southern California:		
Los Angeles	--	12,000
Total	--	12,000
All areas	212	58,290

Table 64.--*Number of "other industry" mills with selected equipment, by resource area and county, California, 1972*

Resource area and county	Chipper	Barker	Burner
North Coast:			
Del Norte	--	--	1
Humboldt	--	--	--
Mendocino	--	--	--
Sonoma	--	--	--
Total	--	--	1
Northern Interior:			
Siskiyou	--	1	--
Total	--	1	--
Sacramento:			
Butte	--	1	1
Total	--	1	1
San Joaquin:			
Madera	--	--	--
San Joaquin	--	1	--
Total	--	1	--
Southern California:			
Los Angeles	--	1	--
Total	--	1	--
All areas	--	4	2

Table 65.--*Number of "other industry" mills by years of tenure of present ownership, type of mill, and years at site, California, 1972*

Type of mill and years at site	All mills	Tenure of present mill ownership (years)				
		0-2	3-5	6-10	11-20	21+
Shake and shingle:						
0 - 2	1	1	--	--	--	--
3 - 5	2	--	1	1	--	--
6 - 10	3	--	--	3	--	--
11 - 20	1	--	1	--	--	--
Total	7	1	2	4	--	--
Export:						
3 - 5	2	--	2	--	--	--
6 - 10	4	--	--	--	2	2
Total	6	--	2	--	2	2
Post, pole, and piling:						
3 - 5	1	--	1	--	--	--
11 - 20	2	--	--	--	2	--
21+	3	--	--	--	--	3
Total	6	--	1	--	2	3
All mills:						
0 - 2	1	1	--	--	--	--
3 - 5	5	--	4	1	--	--
6 - 10	7	--	--	3	2	2
11 - 20	3	--	1	--	2	--
21+	3	--	--	--	--	3
Total	19	1	5	4	4	5

Table 66.--*Average number of operating days per year of "other industry" mills by type of mill and resource area, California, 1972*

Resource area	Shake and shingle	Post, pole, and piling
North Coast	157	110
Northern Interior	--	300
Sacramento	--	240
San Joaquin	--	223
Southern California	--	300
All areas	157	233

Table 67.--*Log consumption by "other industry" mills by type of material and type of mill, California, 1972*

(Thousand board feet, local scale)

Type of mill	All types	Sound logs		Utility logs	Other[1/]
		Live	Dead		
Shake and shingle	2,676	605	551	1,520	--
Export	75,665	75,665	--	--	--
Post, pole, and piling	14,703	13,136	--	242	1,325
Total	93,044	89,406	551	1,762	1,325

[1/] Lumber, cross ties, and miscellaneous other products.

Table 68.--*Log consumption by "other industry" mills by timber age group and type of mill, California, 1972*

(Thousand board feet, local scale)

Type of mill	All age groups	Old growth (100+ years)	Young growth (less than 100 years)
Shake and shingle	2,676	2,676	--
Export	75,665	24,190	51,475
Post, pole, and piling	13,378	--	13,378
Total	91,719	26,866	64,853

Table 69.--*Log consumption of "other industry" mills by ownership class and type of mill, California, 1972*

(Thousand board feet, local scale)

Type of mill	All owners	National Forest	State	Forest industry		Farmer and miscellaneous private
				Own wood supply	Other wood supply	
Shake and shingle	2,676	--	241	1,350	275	810
Export	75,665	7,031	1,890	--	38,157	28,587
Post, pole, and piling	13,378	395	--	1,554	3,847	7,582
Total	91,719	7,426	2,131	2,904	42,279	36,979

Table 70.--Dependency of "other industry" mills for logs by ownership origin, resource area, and type of mill, California, 1972

(Number of mills)

Resource area and type of mill	National Forest				State				Bureau of Land Management				Other public				Forest industry								Farmer and miscellaneous private			
																	Own wood supply				Other wood supply							
	Dependency percent																											
	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100	0	1-32	33-66	67-100
North Coast:																												
Shake and shingle	7	--	--	--	4	--	--	3	7	--	--	--	7	--	--	--	7	--	--	--	4	2	--	1	3	2	--	2
Export	3	1	--	--	4	--	--	--	4	--	--	--	4	--	--	--	4	--	--	--	1	--	--	3	3	--	--	1
Post, pole, and piling	--	--	1	--	1	--	--	--	1	--	--	--	1	--	--	--	1	--	--	--	1	--	--	--	--	--	1	--
Total	10	1	1	--	9	--	--	3	12	--	--	--	12	--	--	--	12	--	--	--	6	2	--	4	6	2	1	3
Northern Interior:																												
Post, pole, and piling	1	--	--	--	1	--	--	--	1	--	--	--	1	--	--	--	--	--	1	--	--	1	--	--	--	--	1	--
Sacramento:																												
Export	--	--	1	--	1	--	--	--	1	--	--	--	1	--	--	--	1	--	--	--	--	--	1	--	--	1	--	--
Post, pole, and piling	--	1	--	--	1	--	--	--	1	--	--	--	1	--	--	--	1	--	--	--	--	--	1	--	--	--	1	--
Total	--	1	1	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	--	--	2	--	--	1	1	--
San Joaquin:																												
Export	--	1	--	--	--	1	--	--	1	--	--	--	1	--	--	--	1	--	--	--	--	--	1	--	--	1	--	--
Post, pole, and piling	1	1	--	--	2	--	--	--	2	--	--	--	2	--	--	--	2	--	--	--	1	1	--	--	--	--	--	2
Total	1	2	--	--	2	1	--	--	3	--	--	--	3	--	--	--	3	--	--	--	1	1	1	--	--	1	--	2
Southern California:																												
Post, pole, and piling	1	--	--	--	1	--	--	--	1	--	--	--	1	--	--	--	--	--	1	--	--	1	--	--	--	--	1	--
All areas:																												
Shake and shingle	7	--	--	--	4	--	--	3	7	--	--	--	7	--	--	--	7	--	--	--	4	2	--	1	3	2	--	2
Export	3	2	1	--	5	1	--	--	6	--	--	--	6	--	--	--	6	--	--	--	1	--	2	3	3	2	--	1
Post, pole, and piling	3	2	1	--	6	--	--	--	6	--	--	--	6	--	--	--	4	--	2	--	2	3	1	--	--	--	4	2
Total	13	4	2	--	15	1	--	3	19	--	--	--	19	--	--	--	17	--	2	--	7	5	3	4	6	4	4	5

Table 71.--Log consumption by "other industry" mills by species, type of mill, and type of material, California, 1972

(Thousand board feet, local scale)

Type of mill and material	All species	Douglas-fir	Hemlock	True firs	Redwood	Ponderosa and sugar pines	Incense-cedar	Other softwoods	Hardwoods
Shake and shingle:									
Sound	1,156	--	--	--	586	--	--	570	--
Utility	1,520	--	--	--	1,420	--	--	100	--
Total	2,676	--	--	--	2,006	--	--	670	--
Export:									
Sound	75,665	21,586	2,981	20,101	7,754	13,372	1,113	8,758	--
Utility	--	--	--	--	--	--	--	--	--
Total	75,665	21,586	2,981	20,101	7,754	13,372	1,113	8,758	--
Post, pole, and piling:									
Sound	13,136	8,623	--	182	--	4,258	--	73	--
Utility	242	122	--	69	--	23	--	28	--
Total	13,378	8,745	--	251	--	4,281	--	101	--
All mills:									
Sound	89,957	30,209	2,981	20,283	8,340	17,630	1,113	9,401	--
Utility	1,762	122	--	69	1,420	23	--	128	--
Total	91,719	30,331	2,981	20,352	9,760	17,653	1,113	9,529	--

Table 72.--*Production and disposition of wood and bark residues by shake and shingle mills, California, 1972*

(Tons, dry weight)

Type of residue	Total	Used				Unused
		Total	Pulp and board	Fuel	Other	
Wood	1,351	976	26	434	516	375
Bark	559	157	--	157	--	402
All residue	1,910	1,133	26	591	516	777

Table 73.--*Product output by "other industries" by type of mill, California, 1972*

Production	Shake and shingle	Shipments		
		Export	Post, pole, and piling	
			Treated	Untreated
	Squares	- - *Thousand board feet, local scale* - -		
State total	20,573	75,665	18,320	95

Howard, James O.
1974. California forest industry wood consumption and characteristics, 1972. USDA For. Serv. Resour. Bull. PNW-52, 91 p. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

This report presents the findings of a 100-percent canvass of the primary forest products industry of the State of California, 1972. Tabular presentation includes characteristics of the industry, log consumption statistics, and disposition of mill residues. Accompanying the tables is a descriptive analysis of current conditions and past trends in the industry.

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1. Providing safe and efficient technology for inventory, protection, and use of resources.
2. Development and evaluation of alternative methods and levels of resource management.
3. Achievement of optimum sustained resource productivity consistent with maintaining a high quality forest environment.

The area of research encompasses Oregon, Washington, Alaska, and, in some cases, California, Hawaii, the Western States, and the Nation. Results of the research will be made available promptly. Project headquarters are at:

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1974
USDA FOREST SERVICE RESOURCE BULLETIN PNW-53

TIMBER RESOURCE STATISTICS FOR WASHINGTON

JANUARY 1, 1973

Patricia M. Bassett
Grover A. Choate

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
U.S. Department of Agriculture Forest Service Portland, Oregon

ABSTRACT

Timber resource statistics to January 1, 1973, for the State of Washington show total land area, commercial timberland area, and growing stock and sawtimber inventory volumes by county and owner group. Growth and removals are shown by Forest Survey inventory unit for 1972. Each National Forest is updated to January 1, 1973.

Keywords: Forest surveys (Washington), resources (timber), statistics (timber).

PREFACE

For an area as large as Washington, a complete inventory of the timber resources is usually not possible within a single year nor is it feasible to reinventory every year to maintain current statistics. Yet, with rapid change in the forest situation, it is desirable to have current statistics readily available.

Statistics in this report update many of the 1970 statistics shown for the State of Washington in the last national timber appraisal (USDA Forest Service 1973). The tables also show data for counties or county groups. Area and volume statistics are as of January 1, 1973; growth and removals are for 1972. These statistics were updated by Forest Survey, a nationwide project of the Forest Service.

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UPDATING PROCEDURES

The methods described here were used to update inventory data to January 1, 1973. Data were from field surveys made since 1962. National Forest lands were inventoried by National Forest Administration; other lands, by Forest Survey. Data for all lands were assembled by Forest Survey and published for each of five inventory units in the State (Arbogast 1974; Bolsinger 1969, 1971; Hazard 1965; Howard 1973).

A stand projection model, TRAS--Timber Resource Analysis System (Larson and Goforth 1970), used nationwide by Forest Survey, was used to update these data to January 1, 1973. This model projects stands by calculating annual change in numbers of trees by 2-inch diameter classes. Land base changes, utilization, and ingrowth are allowed for in the model. Results are annual statements of inventory volume, net growth, removals, and mortality in board and cubic feet.

Using this model, we updated each National Forest and each of three ownership classes--other public, forest industry, and farmer and miscellaneous private--separately by inventory unit. In general, updating was done by extending to 1973 the updated 1970 estimates made for the study, "The Outlook for Timber in the United States" (USDA Forest Service 1973), with the exception of the Inland Empire area in eastern Washington. The Inland Empire data used for the "Outlook" report were preliminary and have been modified.

In updating the "Outlook" report data from 1970, we adjusted area and volume to account for change since that time. Area was adjusted to account for nominal losses from commercial forest land for roads, powerlines, reservoirs, etc. Major shifts in public lands between ownerships or from one National Forest to another were also accounted for. Volume was reduced to account for timber cutting by ownership within inventory unit. Information on cut came from the annual timber harvest reports of the Washington Department of Natural Resources (State of Washington 1962-72), as well as from timber harvesting data compiled by National Forest Administration. The inventory volumes by ownership for each inventory unit were then proportioned among the counties within units. To determine proportions, we first reduced the volume for each county at the time of original inventory by the volume of cut from year to year through 1972. The residual volumes then provided the basis for determining county proportions.

The updating procedure provides estimates of total net annual growth for each ownership at the inventory unit level. The procedure assumes the same average growth rates for all counties within each ownership. Since the counties within a unit are generally homogeneous, the estimates of total growth for the ownership derived in this manner appear reasonable. Available information and procedures are not considered adequate to allocate growth to counties.

Updated statistics are less reliable and less detailed than estimates provided by new inventories. Updating, in addition to carrying along the sampling errors associated with the original survey, does not allow for evaluation of some conditions that change from year to year. For instance, lack of data on annual cut and mortality by species precludes updating of volume and growth by species in greater detail than by softwoods

and hardwoods. Short-term updated statistics are, of course, generally more reliable than long-term ones. County statistics are subject to considerable sampling error. In general, the larger the forest area in the county, the more reliable the estimates.

METRIC CONVERSIONS

1,000 acres	= 404.71 hectares
1,000 cubic feet	= 28.3 cubic meters
1 cubic foot per acre	= 0.7 cubic meter per hectare
1 square foot basal area per acre	= 0.2296 square meter per hectare
1 mile	= 1.609 kilometers
1 foot	= 30.480 centimeters
1 inch	= 2.540 centimeters

Table 1.--Land area by major class of land by county and inventory unit, Washington, January 1, 1973

(In thousand acres)

County and inventory unit	Total land area[1/]	Forest land					Nonforest land[2/]
		Total	Commercial	Productive-reserved	Deferred	Unproductive	
WESTERN WASHINGTON							
Olympic Peninsula:							
Clallam	1,122	971	684	168	--	119	151
Grays Harbor	1,222	1,107	1,076	10	--	21	115
Jefferson	1,155	1,031	528	318	--	185	124
Mason	616	554	464	56	--	34	62
Thurston	457	298	282	1	--	15	159
Total	4,572	3,961	3,034	553	--	374	611
Puget Sound:							
Island	136	79	77	2	--	--	57
King	1,363	909	729	1	37	142	454
Kitsap	251	182	171	10	--	1	69
Pierce	1,073	741	558	94	--	89	332
San Juan	115	81	--	81	--	--	34
Skagit	1,111	843	567	56	--	220	268
Snohomish	1,343	995	676	50	18	251	348
Whatcom	1,361	944	435	155	--	354	417
Total	6,753	4,774	3,213	449	55	1,057	1,979
Southwest Washington:							
Clark	401	219	217	(3/)	--	2	182
Cowlitz	732	646	643	(3/)	--	3	86
Lewis	1,567	1,364	1,224	58	--	82	203
Pacific	581	535	518	2	--	15	46
Skamania	1,070	1,001	912	11	--	78	69
Wahkiakum	167	149	140	--	--	9	18
Total	4,518	3,914	3,654	71	--	189	604
Total western Washington	15,843	12,649	9,901	1,073	55	1,620	3,194
EASTERN WASHINGTON							
Central Washington:							
Benton	1,102	--	--	--	--	--	1,102
Chelan-Douglas	3,050	1,316	746	66	42	462	1,734
Grant	1,716	--	--	--	--	--	1,716
Kittitas	1,485	769	655	(3/)	14	100	716
Klickitat	1,221	556	503	1	--	52	665
Okanogan	3,393	2,275	1,618	203	--	454	1,118
Yakima	2,734	1,089	840	60	28	161	1,645
Total	14,701	6,005	4,362	330	84	1,229	8,696
Inland Empire:							
Adams	1,212	--	--	--	--	--	1,212
Asotin	405	65	55	(3/)	--	10	340
Columbia	551	172	125	1	--	46	379
Ferry	1,409	1,229	1,111	4	--	114	180
Franklin	806	--	--	--	--	--	806
Garfield	456	90	65	--	--	25	366
Lincoln	1,475	80	77	2	--	1	1,395
Pend Oreille	897	805	778	3	4	20	92
Spokane	1,125	438	408	28	--	2	687
Stevens	1,588	1,336	1,296	5	--	35	252
Walla Walla	811	15	13	--	--	2	796
Whitman	1,386	9	9	--	--	--	1,377
Total	12,121	4,239	3,937	43	4	255	7,882
Total eastern Washington	26,822	10,244	8,299	373	88	1,484	16,578
Total Washington	42,665	22,893	18,200	1,446	143	3,104	19,772

1/ U.S. Bureau of the Census, Land and Water Area of the United States, 1960. (Revised February 1965.)

2/ Includes 87,000 acres classed as water by Forest Survey standards but defined as land by the Bureau of the Census.

3/ Less than 500 acres.

Table 2.--Area of commercial timberland by ownership class and by county and inventory unit, Washington, January 1, 1973

(In thousand acres)

County and inventory unit	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
			WESTERN WASHINGTON		
Olympic Peninsula:					
Clallam	684	178	183	217	106
Grays Harbor	1,076	130	263	484	199
Jefferson	528	122	201	115	90
Mason	464	103	63	223	75
Thurston	282	(1/)	74	93	115
Total	3,034	533	784	1,132	585
Puget Sound:					
Island	77	--	5	5	67
King	729	157	129	243	200
Kitsap	171	--	35	27	109
Pierce	558	113	82	201	162
Skagit	567	144	119	194	110
Snohomish	676	221	135	115	205
Whatcom	435	110	90	101	134
Total	3,213	745	595	886	987
Southwest Washington:					
Clark	217	1	54	44	118
Cowlitz	643	18	76	411	138
Lewis	1,224	325	109	543	247
Pacific	518	--	67	385	66
Skamania	912	692	76	90	54
Wahkiakum	140	--	29	90	21
Total	3,654	1,036	411	1,563	644
Total western Washington	9,901	2,314	1,790	3,581	2,216
			EASTERN WASHINGTON		
Central Washington:					
Chelan-Douglas	746	549	48	65	84
Kittitas	655	265	86	109	195
Klickitat	503	10	125	194	174
Okanogan	1,618	765	554	29	270
Yakima	840	271	508	39	22
Total	4,362	1,860	1,321	436	745
Inland Empire:					
Asotin	55	24	3	--	28
Columbia	125	72	5	4	44
Ferry	1,111	408	529	46	128
Garfield	65	51	2	1	11
Lincoln	77	--	7	--	70
Pend Oreille	778	460	41	41	236
Spokane	408	--	21	24	363
Stevens	1,296	225	338	186	547
Walla Walla	13	--	1	--	12
Whitman	9	--	(1/)	--	9
Total	3,937	1,240	947	302	1,448
Total eastern Washington	8,299	3,100	2,268	738	2,193
Total Washington	18,200	5,414	4,058	4,319	4,409

1/ Less than 500 acres.

Table 3.-- Area of commercial timberland, net volume, net annual growth, and removals of growing stock and sawtimber, by ownership class and by softwoods and hardwoods, Washington[1/]

Ownership class		Growing stock			Sawtimber (International 1/4-inch rule)			Sawtimber (Scribner rule)		
Species	Area	Volume	Growth	Removals	Volume	Growth	Removals	Volume	Growth	Removals
	Thousand acres	*Million cubic feet*	*- Thousand cubic feet -*		*Million board feet*	*- - Thousand board feet - -*		*Million board feet*	*- - Thousand board feet*	
WESTERN WASHINGTON										
tional Forest:	2,314									
Softwoods		15,027	78,100	150,300	90,224	449,000	1,008,000	71,394	345,000	815,000
Hardwoods		133	4,100	(2/)	606	17,000	(3/)	459	13,000	(3/)
All species		15,160	82,200	150,300	90,830	466,000	1,008,000	71,853	358,000	815,000
ner public:	1,790									
Softwoods		8,382	205,200	224,000	42,531	988,000	1,466,000	31,531	705,000	1,184,000
Hardwoods		1,064	52,500	5,800	2,899	146,000	23,000	2,808	142,000	22,000
All species		9,446	257,700	229,800	45,430	1,134,000	1,489,000	34,339	847,000	1,206,000
rest industry:	3,581									
Softwoods		12,376	319,900	662,300	67,316	1,588,000	3,964,000	51,109	1,163,000	3,105,000
Hardwoods		2,035	92,300	35,300	5,711	309,000	119,000	5,545	301,000	114,000
All species		14,411	412,200	697,600	73,027	1,897,000	4,083,000	56,654	1,464,000	3,219,000
rmer and miscellaneous rivate:	2,216									
Softwoods		4,906	201,100	166,900	21,845	960,000	835,000	15,590	685,000	615,000
Hardwoods		2,319	100,000	15,700	7,408	331,000	59,000	7,196	322,000	57,000
All species		7,225	301,100	182,600	29,253	1,291,000	894,000	22,786	1,007,000	672,000
tal western Washington:	9,901									
Softwoods		40,691	804,300	1,203,500	221,916	3,985,000	7,273,000	169,624	2,898,000	5,719,000
Hardwoods		5,551	248,900	56,800	16,624	803,000	201,000	16,008	778,000	193,000
All species		46,242	1,053,200	1,260,300	238,540	4,788,000	7,474,000	185,632	3,676,000	5,912,000
EASTERN WASHINGTON										
tional Forest:	3,100									
Softwoods		8,275	94,800	81,800	37,298	397,100	513,000	32,129	339,500	452,000
Hardwoods		34	1,100	--	94	2,900	--	87	2,500	--
All species		8,309	95,900	81,800	37,392	400,000	513,000	32,216	342,000	452,000
ner public:	2,268									
Softwoods		4,818	61,100	75,600	20,687	291,500	440,000	17,860	251,400	403,000
Hardwoods		58	600	--	211	4,500	--	207	4,600	--
All species		4,876	61,700	75,600	20,898	296,000	440,000	18,067	256,000	403,000
rest industry:	738									
Softwoods		1,341	32,100	24,300	5,145	127,700	135,000	4,352	106,700	121,000
Hardwoods		18	500	--	42	1,300	--	40	1,300	--
All species		1,359	32,600	24,300	5,187	129,000	135,000	4,392	108,000	121,000
rmer and miscellaneous rivate:	2,193									
Softwoods		3,144	75,500	36,900	10,246	298,900	197,900	8,445	246,800	174,900
Hardwoods		65	1,700	--	87	1,100	100	82	1,200	100
All species		3,209	77,200	36,900	10,333	300,000	198,000	8,527	248,000	175,000
tal eastern Washington:	8,299									
Softwoods		17,578	263,500	218,600	73,376	1,115,200	1,285,900	62,786	944,400	1,150,900
Hardwoods		175	3,900	--	434	9,800	100	416	9,600	100
All species		17,753	267,400	218,600	73,810	1,125,000	1,286,000	63,202	954,000	1,151,000
tal Washington:	18,200									
Softwoods		58,269	1,067,800	1,422,100	295,292	5,100,200	8,558,900	232,410	3,842,400	6,869,900
Hardwoods		5,726	252,800	56,800	19,058	812,800	201,100	16,424	787,600	193,900
All species		63,995	1,320,600	1,478,900	312,350	5,913,000	8,760,000	248,834	4,630,000	7,063,000

1/ As of January 1, 1973, for area and volume and for 1972 for growth and removals.

2/ Less than 50,000 cubic feet.

3/ Less than 50,000 board feet.

Table 4.--Area of commercial timberland, net volume, net annual growth, and removals of growing stock, by ownership class and by softwoods and hardwoods, Washington[1/]

(Metric equivalents of area and cubic volumes of table 3)

Ownership class		Volume	Growth	Removals
Species	Area			
	Thousand hectares	*Million cubic meters*	*- - - - Thousand cubic meters - - - -*	
		WESTERN WASHINGTON		
National Forest:	937			
Softwoods		425	2,200	4,300
Hardwoods		4	100	(2/)
All species		429	2,300	4,300
Other public:	724			
Softwoods		238	5,800	6,300
Hardwoods		30	1,500	200
All species		268	7,300	6,500
Forest industry:	1,449			
Softwoods		350	9,100	18,800
Hardwoods		58	2,600	1,000
All species		408	11,700	19,800
Farmer and miscellaneous private:	897			
Softwoods		139	5,700	4,700
Hardwoods		66	2,800	400
All species		205	8,500	5,100
Total western Washington:	4,007			
Softwoods		1,152	22,800	34,100
Hardwoods		158	7,000	1,600
All species		1,310	29,800	35,700
		EASTERN WASHINGTON		
National Forest:	1,254			
Softwoods		234	2,700	2,300
Hardwoods		1	(2/)	--
All species		235	2,700	2,300
Other public:	918			
Softwoods		136	1,800	2,100
Hardwoods		2	(2/)	(2/)
All species		138	1,800	2,100
Forest industry:	299			
Softwoods		38	900	700
Hardwoods		(3/)	(2/)	--
All species		38	900	700
Farmer and miscellaneous private:	888			
Softwoods		89	2,100	1,000
Hardwoods		2	100	--
All species		91	2,200	1,000
Total eastern Washington:	3,359			
Softwoods		498	7,500	6,200
Hardwoods		5	100	(2/)
All species		503	7,600	6,200
Total Washington:	7,366			
Softwoods		1,650	30,300	40,300
Hardwoods		163	7,100	1,600
All species		1,813	37,400	41,900

1/ As of January 1, 1973, for area and volume and for 1972 for growth and removals.

2/ Less than 50,000 cubic meters.

3/ Less than 500,000 cubic meters.

Table 5.--Area of commercial timberland, net volume, net annual growth, and removals of growing stock and sawtimber, by National Forest and by softwoods and hardwoods, Washington [1/]

National Forest / Species	Area	Growing stock			Sawtimber (International 1/4-inch rule)			Sawtimber (Scribner rule)		
		Volume	Growth	Removals	Volume	Growth	Removals	Volume	Growth	Removals
	Thousand acres	Million cubic feet	-- Annual cubic feet --		Million board feet	-- Annual board feet --		Million board feet	-- Thousand board feet	
Colville:	836									
Softwoods		1,330	20,900	11,800	4,973	90,000	68,000	4,257	78,000	62,200
Hardwoods		13	600	--	9	--	--	9	-	-
All species		1,343	21,500	11,800	4,982	90,000	68,000	4,266	78,000	62,200
Gifford Pinchot:	1,095									
Softwoods		6,797	54,800	68,000	38,631	341,000	440,000	29,939	261,000	352,000
Hardwoods		35	500	--	138	2,000	--	132	2,000	--
All species		6,832	55,300	68,000	38,769	343,000	440,000	30,071	263,000	352,000
Kaniksu: [2/]	257									
Softwoods		552	10,200	8,700	2,068	45,100	52,000	1,761	38,200	47,000
Hardwoods		6	200	--	32	900	--	27	800	--
All species		558	10,400	8,700	2,100	46,000	52,000	1,788	39,000	47,000
Mount Baker:	406									
Softwoods		3,189	10,200	23,800	19,243	51,000	158,000	15,509	40,000	131,000
Hardwoods		40	1,900	--	192	7,000	--	134	5,000	--
All species		3,229	12,100	23,800	19,435	58,000	158,000	15,643	45,000	131,000
Okanogan:	765									
Softwoods		1,675	16,800	19,000	7,236	66,300	126,000	6,106	55,600	109,000
Hardwoods		9	200	--	30	1,700	--	29	1,400	--
All species		1,684	17,000	19,000	7,266	68,000	126,000	6,135	57,000	109,000
Olympic:	533									
Softwoods		3,485	8,600	40,400	22,822	31,000	290,000	18,436	22,000	237,000
Hardwoods		38	1,200	(3/)	177	5,000	(4/)	127	4,000	(4/)
All species		3,523	9,800	40,400	22,999	36,000	290,000	18,563	26,000	237,000
Snoqualmie:	601									
Softwoods		3,027	16,500	30,000	17,386	80,700	198,000	14,215	67,700	162,000
Hardwoods		24	600	--	119	3,300	--	85	2,300	--
All species		3,051	17,100	30,000	17,505	84,000	198,000	14,300	70,000	162,000
Umatilla: [2/]	147									
Softwoods		460	5,400	2,700	2,007	26,000	18,000	1,709	22,000	16,000
Hardwoods		--	--	--	--	--	--	--	--	--
All species		460	5,400	2,700	2,007	26,000	18,000	1,709	22,000	16,000
Wenatchee:	774									
Softwoods		2,787	29,500	27,700	13,156	115,000	171,000	11,591	100,000	151,000
Hardwoods		2	--	--	3	(4/)	--	3	(4/)	-
All species		2,789	29,500	[5/] 27,700	13,159	115,000	[5/] 171,000	11,594	100,000	[5/] 151,000
All National Forests:	5,414									
Softwoods		23,302	172,900	232,100	127,522	846,100	1,521,000	103,523	684,500	1,267,000
Hardwoods		167	5,200	(3/)	700	19,900	(4/)	546	15,600	(4/)
All species		23,469	178,100	232,100	128,222	866,000	1,521,000	104,069	700,100	1,267,000

1/ As of January 1, 1973, for area and volume and for 1972 for growth and removals. These figures show total volume and growth on [illegible] of the commercial forest land base in each National Forest. On some of these acres, timber removals are limited because of other resource values. These figures do not provide a basis for evaluating the current level of timber removals in terms of each forest's management objectives.

2/ Most of the Kaniksu National Forest is in Idaho, and most of the Umatilla National Forest is in Oregon.

3/ Less than 50,000 cubic feet.

4/ Less than 50,000 board feet.

5/ Includes salvage from 1970 fires.

Table 6.--*Net volume of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Olympic Peninsula, Washington, January 1, 1973*

Ownership class	Volume per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Million cubic feet* - - - - - -		
All growing stock:				
National Forest	6,610	3,523	3,485	38
Other public	5,820	4,563	4,168	395
Forest industry	4,261	4,823	3,996	827
Farmer and miscellaneous private	3,993	2,336	1,747	589
All ownerships	5,025	15,245	13,396	1,849
	Board feet	- - - - - - - *Million board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	43,150	22,999	22,822	177
Other public	28,625	22,442	21,530	912
Forest industry	20,014	22,656	20,422	2,234
Farmer and miscellaneous private	16,552	9,683	7,714	1,969
All ownerships	25,636	77,780	72,488	5,292
Sawtimber (Scribner rule):				
National Forest	34,827	18,563	18,436	127
Other public	21,446	16,814	15,931	883
Forest industry	15,004	16,985	14,813	2,172
Farmer and miscellaneous private	12,629	7,388	5,482	1,906
All ownerships	19,693	59,750	54,662	5,088

Table 7.--*Net volume of growing stock and sawtimber on commercial timberland by county and by ownership class, Olympic Peninsula, Washington, January 1, 1973*

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
			Million cubic feet		
All growing stock:					
Clallam	4,029	1,009	1,189	1,130	701
Grays Harbor	4,654	933	875	1,973	873
Jefferson	3,840	843	2,173	566	258
Mason	2,055	735	162	841	317
Thurston	667	3	164	313	187
All counties	15,245	3,523	4,563	4,823	2,336
			Million board feet		
Sawtimber (International 1/4-inch rule):					
Clallam	21,155	6,377	5,597	5,853	3,328
Grays Harbor	22,530	6,461	3,830	8,468	3,771
Jefferson	21,437	5,449	11,983	3,129	876
Mason	10,095	4,693	474	3,774	1,154
Thurston	2,563	19	558	1,432	554
All counties	77,780	22,999	22,442	22,656	9,683
Sawtimber (Scribner rule):					
Clallam	16,122	4,938	4,159	4,461	2,564
Grays Harbor	17,164	5,357	2,707	6,229	2,871
Jefferson	16,654	4,361	9,200	2,417	676
Mason	7,849	3,890	318	2,771	870
Thurston	1,961	17	430	1,107	407
All counties	59,750	18,563	16,814	16,985	7,388

Table 8.--*Net annual growth of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Olympic Peninsula, Washington, 1972*

Ownership class	Growth per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - *Thousand cubic feet* - - - - - -		
All growing stock:				
National Forest	18	9,800	8,600	1,200
Other public	138	108,000	83,400	24,600
Forest industry	146	165,700	121,600	44,100
Farmer and miscellaneous private	178	104,200	75,300	28,900
All ownerships	128	387,700	288,900	98,800
	Board feet	- - - - - - *Thousand board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	68	36,000	31,000	5,000
Other public	542	425,000	377,000	48,000
Forest industry	731	828,000	684,000	144,000
Farmer and miscellaneous private	725	424,000	332,000	92,000
All ownerships	565	1,713,000	1,424,000	289,000
Sawtimber (Scribner rule):				
National Forest	49	26,000	22,000	4,000
Other public	395	310,000	264,000	46,000
Forest industry	563	637,000	497,000	140,000
Farmer and miscellaneous private	547	320,000	231,000	89,000
All ownerships	426	1,293,000	1,014,000	279,000

Table 9.--*Removals from growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Olympic Peninsula, Washington, 1972*

Ownership class	Removals per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - *Thousand cubic feet* - - - - - -		
All growing stock:				
National Forest	76	40,400	40,400	(1/)
Other public	183	143,500	142,700	800
Forest industry	136	154,100	149,100	5,000
Farmer and miscellaneous private	99	57,800	53,300	4,500
All ownerships	130	395,800	385,500	10,300
	Board feet	- - - - - - *Thousand board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	544	290,000	290,000	(2/)
Other public	1,173	920,000	918,000	2,000
Forest industry	753	853,000	836,000	17,000
Farmer and miscellaneous private	497	291,000	272,000	19,000
All ownerships	776	2,354,000	2,316,000	38,000
Sawtimber (Scribner rule):				
National Forest	445	237,000	237,000	(2/)
Other public	936	734,000	732,000	2,000
Forest industry	568	644,000	628,000	16,000
Farmer and miscellaneous private	369	216,000	198,000	18,000
All ownerships	603	1,831,000	1,795,000	36,000

1/ Less than 50,000 cubic feet.

2/ Less than 50,000 board feet.

Table 10.--*Net volume of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Puget Sound, Washington, January 1, 1973*

Ownership class	Volume per acre	All species	Softwoods	Hardwoods
	Cubic feet	*Million cubic feet*		
All growing stock:				
National Forest	6,851	5,104	5,039	65
Other public	4,615	2,746	2,373	373
Forest industry	3,210	2,844	2,347	497
Farmer and miscellaneous private	3,278	3,235	2,133	1,102
All ownerships	4,335	13,929	11,892	2,037
	Board feet	*Million board feet*		
Sawtimber (International 1/4-inch rule):				
National Forest	41,314	30,779	30,474	305
Other public	19,570	11,644	10,504	1,140
Forest industry	13,797	12,224	11,006	1,218
Farmer and miscellaneous private	13,203	13,031	9,586	3,445
All ownerships	21,064	67,678	61,570	6,108
Sawtimber (Scribner rule):				
National Forest	32,961	24,556	24,344	212
Other public	14,163	8,427	7,321	1,106
Forest industry	10,209	9,045	7,866	1,179
Farmer and miscellaneous private	10,015	9,885	6,533	3,352
All ownerships	16,157	51,913	46,064	5,849

Table 11.--*Net volume of growing stock and sawtimber on commercial timberland by county and by ownership class, Puget Sound, Washington, January 1, 1973*

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
			Million cubic feet		
All growing stock:					
Island-Kitsap	910	--	159	81	670
King	3,231	816	584	1,144	687
Pierce	1,666	676	303	438	249
Skagit	2,519	1,106	492	582	339
Snohomish	3,462	1,719	762	213	768
Whatcom	2,141	787	446	386	522
All counties	13,929	5,104	2,746	2,844	3,235
			Million board feet		
Sawtimber (International 1/4-inch rule):					
Island-Kitsap	3,552	--	543	176	2,833
King	15,844	4,920	2,624	5,280	3,020
Pierce	8,132	4,117	1,283	1,865	867
Skagit	12,339	6,650	1,766	2,499	1,424
Snohomish	17,526	10,324	3,549	730	2,923
Whatcom	10,285	4,768	1,879	1,674	1,964
All counties	67,678	30,779	11,644	12,224	13,031
Sawtimber (Scribner rule):					
Island-Kitsap	2,520	--	363	126	2,031
King	11,976	3,864	1,902	3,907	2,303
Pierce	6,140	3,199	923	1,366	652
Skagit	9,604	5,384	1,219	1,872	1,129
Snohomish	13,740	8,279	2,632	555	2,274
Whatcom	7,933	3,830	1,388	1,219	1,496
All counties	51,913	24,556	8,427	9,045	9,885

Table 12.--*Net annual growth of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Puget Sound, Washington, 1972*

Ownership class	Growth per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - *Thousand cubic feet* - - - - - -		
All growing stock:				
National Forest	26	19,500	17,100	2,400
Other public	146	86,700	75,000	11,700
Forest industry	105	93,400	74,600	18,800
Farmer and miscellaneous private	119	117,500	81,500	36,000
All ownerships	99	317,100	248,200	68,900
	Board feet	- - - - - - *Thousand board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	137	102,400	92,300	10,100
Other public	696	414,000	363,000	51,000
Forest industry	438	388,000	315,000	73,000
Farmer and miscellaneous private	566	559,000	433,000	126,000
All ownerships	455	1,463,400	1,203,300	260,100
Sawtimber (Scribner rule):				
National Forest	108	80,700	73,600	7,100
Other public	501	298,000	248,000	50,000
Forest industry	323	286,000	215,000	71,000
Farmer and miscellaneous private	430	424,000	301,000	123,000
All ownerships	339	1,088,700	837,600	251,100

Table 13.--*Removals from growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Puget Sound, Washington, 1972*

Ownership class	Removals per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - *Thousand cubic feet* - - - - - -		
All growing stock:				
National Forest	64	47,500	47,500	--
Other public	77	46,100	43,800	2,300
Forest industry	234	206,900	188,000	18,900
Farmer and miscellaneous private	86	84,800	76,100	8,700
All ownerships	120	385,300	355,400	29,900
	Board feet	- - - - - *Thousand board feet* - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	422	314,100	314,100	--
Other public	462	275,000	267,000	8,000
Forest industry	1,212	1,074,000	1,013,000	61,000
Farmer and miscellaneous private	413	408,000	377,000	31,000
All ownerships	645	2,071,100	1,971,100	100,000
Sawtimber (Scribner rule):				
National Forest	343	255,300	255,300	--
Other public	365	217,000	210,000	7,000
Forest industry	919	814,000	755,000	59,000
Farmer and miscellaneous private	300	296,000	266,000	30,000
All ownerships	492	1,582,300	1,486,300	96,000

Table 14.--*Net volume of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, southwest Washington, January 1, 1973*

Ownership class	Volume per acre	All species	Softwoods	Hardwoods
	Cubic feet	*Million cubic feet*		
All growing stock:				
National Forest	6,306	6,533	6,503	30
Other public	5,200	2,137	1,841	296
Forest industry	4,315	6,744	6,033	711
Farmer and miscellaneous private	2,568	1,654	1,026	628
All ownerships	4,671	17,068	15,403	1,665
	Board feet	*Million board feet*		
Sawtimber (International 1/4-inch rule):				
National Forest	35,765	37,052	36,928	124
Other public	27,601	11,344	10,497	847
Forest industry	24,406	38,147	35,888	2,259
Farmer and miscellaneous private	10,154	6,539	4,545	1,994
All ownerships	25,474	93,082	87,858	5,224
Sawtimber (Scribner rule):				
National Forest	27,736	28,734	28,614	120
Other public	22,136	9,098	8,279	819
Forest industry	19,593	30,624	28,430	2,194
Farmer and miscellaneous private	8,561	5,513	3,575	1,938
All ownerships	20,243	73,969	68,898	5,071

Table 15.--*Net volume of growing stock and sawtimber on commercial timberland by county and by ownership class, southwest Washington, January 1, 1973*

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
			Million cubic feet		
All growing stock:					
Clark	1/ 257	2	94	104	1/ 57
Cowlitz	3,014	120	426	2,148	320
Lewis	5,841	2,618	494	1,833	896
Pacific	1/ 2,228	--	320	1,553	355
Skamania	1/ 5,118	3,793	660	665	(1/)
Wahkiakum	610	--	143	441	26
All counties	17,068	6,533	2,137	6,744	1,654
			Million board feet		
Sawtimber (International 1/4-inch rule)					
Clark	1/ 933	5	401	340	1/ 187
Cowlitz	17,440	726	2,673	12,671	1,370
Lewis	30,924	14,871	2,585	9,902	3,566
Pacific	1/ 11,814	--	1,553	8,902	1,359
Skamania	1/ 28,981	21,450	3,579	3,952	(1/)
Wahkiakum	2,990	--	553	2,380	57
All counties	93,082	37,052	11,344	38,147	6,539
Sawtimber (Scribner rule):					
Clark	1/ 724	4	307	260	1/ 153
Cowlitz	14,234	600	2,158	10,317	1,159
Lewis	23,972	10,996	2,066	7,881	3,029
Pacific	1/ 9,562	--	1,269	7,165	1,128
Skamania	1/ 23,150	17,134	2,860	3,156	(1/)
Wahkiakum	2,327	--	438	1,845	44
All counties	73,969	28,734	9,098	30,624	5,513

1/ Skamania County combined with Clark County in farmer and miscellaneous private ownership class.

Table 16.--*Net annual growth of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, southwest Washington, 1972*

Ownership class	Growth per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - *Thousand cubic feet* - - - - - -		
All growing stock:				
National Forest	51	52,900	52,400	500
Other public	153	63,000	46,800	16,200
Forest industry	98	153,100	123,700	29,400
Farmer and miscellaneous private	123	79,400	44,300	35,100
All ownerships	95	348,400	267,200	81,200
	Board feet	- - - - - - *Thousand board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	316	327,600	325,700	1,900
Other public	718	295,000	248,000	47,000
Forest industry	436	681,000	589,000	92,000
Farmer and miscellaneous private	478	308,000	195,000	113,000
All ownerships	441	1,611,600	1,357,700	253,900
Sawtimber (Scribner rule):				
National Forest	243	251,300	249,400	1,900
Other public	582	239,000	193,000	46,000
Forest industry	346	541,000	451,000	90,000
Farmer and miscellaneous private	408	263,000	153,000	110,000
All ownerships	354	1,294,300	1,046,400	247,900

Table 17.--*Removals from growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, southwest Washington, 1972*

Ownership class	Removals per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - *Thousand cubic feet* - - - - - -		
All growing stock:				
National Forest	60	62,400	62,400	--
Other public	98	40,200	37,500	2,700
Forest industry	215	336,600	325,200	11,400
Farmer and miscellaneous private	62	40,000	37,500	2,500
All ownerships	131	479,200	462,600	16,600
	Board feet	- - - - - - *Thousand board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	390	403,900	403,900	--
Other public	715	294,000	281,000	13,000
Forest industry	1,379	2,156,000	2,115,000	41,000
Farmer and miscellaneous private	303	195,000	186,000	9,000
All ownerships	834	3,048,900	2,985,900	63,000
Sawtimber (Scribner rule):				
National Forest	311	322,700	322,700	--
Other public	620	255,000	242,000	13,000
Forest industry	1,127	1,761,000	1,722,000	39,000
Farmer and miscellaneous private	248	160,000	151,000	9,000
All ownerships	684	2,498,700	2,437,700	61,000

Table 18.--*Net volume of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, central Washington, January 1, 1973*

Ownership class	Volume per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - *Million cubic feet* - - - - - -		
All growing stock:				
National Forest	3,198	5,948	5,933	15
Other public	2,402	3,173	3,166	7
Forest industry	1,773	773	771	2
Farmer and miscellaneous private	1,545	1,151	1,120	31
All ownerships	2,532	11,045	10,990	55
	Board feet	- - - - - - *Million board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	15,217	28,303	28,250	53
Other public	10,493	13,861	13,839	22
Forest industry	7,372	3,214	3,209	5
Farmer and miscellaneous private	6,236	4,646	4,606	40
All ownerships	11,468	50,024	49,904	120
Sawtimber (Scribner rule):				
National Forest	13,147	24,453	24,402	51
Other public	9,153	12,091	12,069	22
Forest industry	6,303	2,748	2,743	5
Farmer and miscellaneous private	5,298	3,947	3,909	38
All ownerships	9,913	43,239	43,123	116

Table 19.--*Net volume of growing stock and sawtimber on commercial timberland by county and by ownership class, central Washington, January 1, 1973*

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
			Million cubic feet		
All growing stock:					
Chelan-Douglas	2,217	1,777	125	190	125
Kittitas	2,154	1,191	144	234	585
Klickitat	1/881	97	333	235	1/216
Okanogan	2,822	1,684	894	19	225
Yakima	1/2,971	1,199	1,677	95	(1/)
All counties	11,045	5,948	3,173	773	1,151
			Million board feet		
Sawtimber (International 1/4-inch rule):					
Chelan-Douglas	9,913	8,036	521	849	507
Kittitas	10,133	6,045	515	979	2,594
Klickitat	1/4,033	609	1,624	960	1/840
Okanogan	11,624	7,266	3,574	79	705
Yakima	1/14,321	6,347	7,627	347	(1/)
All counties	50,024	28,303	13,861	3,214	4,646
Sawtimber (Scribner rule):					
Chelan-Douglas	8,702	7,109	435	731	427
Kittitas	8,820	5,316	439	841	2,224
Klickitat	1/3,381	448	1,424	810	1/699
Okanogan	9,864	6,135	3,063	69	597
Yakima	1/12,472	5,445	6,730	297	(1/)
All counties	43,239	24,453	12,091	2,748	3,947

1/ Yakima County combined with Klickitat County in farmer and miscellaneous private ownership class.

Table 20.--*Net annual growth of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, central Washington, 1972*

Ownership class	Growth per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - *Thousand cubic feet* - - - - - -		
All growing stock:				
National Forest	32	58,600	58,300	300
Other public	26	33,800	33,700	100
Forest industry	28	12,200	12,200	--
Farmer and miscellaneous private	28	21,200	20,300	900
All ownerships	29	125,800	124,500	1,300
	Board feet	- - - - - - *Thousand board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	128	238,000	236,000	2,000
Other public	116	153,000	152,500	500
Forest industry	119	52,000	52,000	--
Farmer and miscellaneous private	128	95,000	94,800	200
All ownerships	123	538,000	535,300	2,700
Sawtimber (Scribner rule):				
National Forest	109	203,000	201,300	1,700
Other public	100	132,000	131,600	400
Forest industry	101	44,000	44,000	--
Farmer and miscellaneous private	110	82,000	81,700	300
All ownerships	106	461,000	458,600	2,400

Table 21.--*Removals from growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, central Washington, 1972*

Ownership class	Removals per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - *Thousand cubic feet* - - - - - -		
All growing stock:				
National Forest	32	58,600	58,600	--
Other public	34	44,900	44,900	--
Forest industry	30	12,900	12,900	--
Farmer and miscellaneous private	23	16,800	16,800	--
All ownerships	31	133,200	133,200	--
	Board feet	- - - - - - *Thousand board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	202	375,000	375.000	--
Other public	202	267,000	267,000	--
Forest industry	170	74,000	74,000	--
Farmer and miscellaneous private	129	96,000	96,000	--
All ownerships	186	812,000	812,000	--
Sawtimber (Scribner rule):				
National Forest	176	327,000	327,000	--
Other public	187	247,000	247,000	--
Forest industry	154	67,000	67,000	--
Farmer and miscellaneous private	117	87,000	87,000	--
All ownerships	167	728,000	728,000	--

Table 22.--*Net volume of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Inland Empire, Washington, January 1, 1973*

Ownership class	Volume per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - *Million cubic feet* - - - - - -		
All growing stock:				
National Forest	1,904	2,361	2,342	19
Other public	1,798	1,703	1,652	51
Forest industry	1,940	586	570	16
Farmer and miscellaneous private	1,421	2,058	2,024	34
All ownerships	1,704	6,708	6,588	120
	Board feet	- - - - - - *Million board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	7,330	9,089	9,048	41
Other public	7,431	7,037	6,848	189
Forest industry	6,533	1,973	1,936	37
Farmer and miscellaneous private	3,928	5,687	5,640	47
All ownerships	6,042	23,786	23,472	314
Sawtimber (Scribner rule):				
National Forest	6,260	7,763	7,727	36
Other public	6,311	5,976	5,791	185
Forest industry	5,444	1,644	1,609	35
Farmer and miscellaneous private	3,163	4,580	4,536	44
All ownerships	5,071	19,963	19,663	300

Table 23.--*Net volume of growing stock and sawtimber on commercial timberland by county and by ownership class, Inland Empire, Washington, January 1, 1973*

County	All ownership	National Forest	Other public	Forest industry	Farmer and miscellaneous private
			Million cubic feet		
All growing stock:					
Asotin	1/ 108	66	8	1/ --	34
Columbia	1/ 365	260	9	1/ 13	83
Ferry	1,742	662	878	73	129
Garfield	158	134	1	2	21
Lincoln	85	--	7	--	78
Pend Oreille	1,495	842	87	120	446
Spokane	594	--	33	60	501
Stevens	2,138	397	677	318	746
Walla Walla	1/ 10	--	2	(1/)	8
Whitman	13	--	1	--	12
All counties	6,708	2,361	1,703	586	2,058
			Million board feet		
Sawtimber (International 1/4-inch rule):					
Asotin	1/ 395	244	37	1/ --	114
Columbia	1/ 1,623	1,174	29	1/ 62	358
Ferry	7,336	2,586	4,124	303	323
Garfield	650	589	5	4	52
Lincoln	274	--	29	--	245
Pend Oreille	4,737	3,090	263	441	943
Spokane	1,856	--	105	211	1,540
Stevens	6,807	1,406	2,426	952	2,023
Walla Walla	1/ 37	--	10	(1/)	27
Whitman	71	--	9	--	62
All counties	23,786	9,089	7,037	1,973	5,687
Sawtimber (Scribner rule):					
Asotin	1/ 330	207	33	1/ --	90
Columbia	1/ 1,372	1,001	21	1/ 53	297
Ferry	6,302	2,223	3,559	260	260
Garfield	551	501	4	3	43
Lincoln	227	--	25	--	202
Pend Oreille	3,943	2,626	211	362	744
Spokane	1,518	--	87	179	1,252
Stevens	5,629	1,205	2,020	787	1,617
Walla Walla	1/ 31	--	8	(1/)	23
Whitman	60	--	8	--	52
All counties	19,963	7,763	5,976	1,644	4,580

1/ Walla Walla County combined with Columbia County in forest industry ownership class.

Table 24.--*Net annual growth of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Inland Empire, Washington, 1972*

Ownership class	Growth per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - *Thousand cubic feet* - - - - - -		
All growing stock:				
National Forest	30	37,300	36,500	800
Other public	29	27,900	27,400	500
Forest industry	68	20,400	19,900	500
Farmer and miscellaneous private	39	56,000	55,200	800
All ownerships	36	141,600	139,000	2,600
	Board feet	- - - - - - *Thousand board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	131	162,000	161,100	900
Other public	151	143,000	139,000	4,000
Forest industry	255	77,000	75,700	1,300
Farmer and miscellaneous private	142	205,000	204,100	900
All ownerships	149	587,000	579,900	7,100
Sawtimber (Scribner rule):				
National Forest	112	139,000	138,200	800
Other public	131	124,000	119,800	4,200
Forest industry	212	64,000	62,700	1,300
Farmer and miscellaneous private	115	166,000	165,100	900
All ownerships	125	493,000	485,800	7,200

Table 25.--*Removals from growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Inland Empire, Washington, 1972*

Ownership class	Removals per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - *Thousand cubic feet* - - - - - -		
All growing stock:				
National Forest	19	23,200	23,200	--
Other public	32	30,700	30,700	--
Forest industry	38	11,400	11,400	--
Farmer and miscellaneous private	14	20,100	20,100	(1/)
All ownerships	22	85,400	85,400	(1/)
	Board feet	- - - - - - *Thousand board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	111	138,000	138,000	--
Other public	183	173,000	173,000	--
Forest industry	202	61,000	61,000	--
Farmer and miscellaneous private	70	102,000	101,900	100
All ownerships	120	474,000	473,900	100
Sawtimber (Scribner rule):				
National Forest	101	125,000	125,000	--
Other public	165	156,000	156,000	--
Forest industry	179	54,000	54,000	--
Farmer and miscellaneous private	61	88,000	87,900	100
All ownerships	107	423,000	422,900	100

1/ Less than 50,000 cubic feet.

DEFINITIONS

Commercial Timberland

Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation.

Deferred Forest Land

National Forest lands that meet productivity standards for commercial timberland but are under study for possible inclusion in the Wilderness System.

Farmer and Miscellaneous Private Lands

Private lands other than those owned by forest industry.

Forest Industry Lands

Lands owned by companies or individuals operating wood-using plants.

Forest Land

Land at least 10 percent stocked by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use. (Also see "Commercial Timberland," "Productive-reserved Forest Land," and "Unproductive Forest Land.") Includes chaparral areas and afforested acres. The minimum area for classification as forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, and clearings in forest areas are classed as forest land if less than 120 feet wide.

Growing Stock Volume

Net volume in cubic feet of live sawtimber and poletimber trees from stump to a minimum 4-inch top (of central stem) outside bark or to the point where the central stem breaks into limbs.

Hardwoods

Dicotyledonous trees, usually broad leaved and deciduous.

Land Area

a. Bureau of the Census. The area of dry land and land temporarily or partly covered by water, such as marshes, swamps and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries and canals less than one-eighth of a statute mile in width; and lakes, reservoirs and ponds less than 40 acres in area.

b. Forest Survey. Same as the Bureau of the Census except minimum width of streams, etc. is 120 feet and minimum size of lakes, etc. is 1 acre.

National Forest Land

Federal lands which have been designated by Executive order or statute as National Forests and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Net Annual Growth

The annual change in volume of sound wood in live sawtimber and poletimber trees resulting from natural causes.

Net Volume in Board Feet

The gross board-foot volume of trees less deductions for rot or other defect affecting use for lumber.

Net Volume in Cubic Feet

Gross volume in cubic feet less deductions for rot.

Nonforest Land

Land that has never supported forests and lands formerly forested but now developed for nonforest uses such as crops, improved pasture, residential areas, city parks, improved roads and adjoining rights-of-way, powerline clearings, and certain areas of water classified by the Bureau of the Census as land (see definition for "Land Area"). In forest areas unimproved roads, streams, canals, and nonforest strips must be more than 120 feet wide, and clearings in forest areas must be more than 1 acre in size, to qualify as nonforest land.

Other Public Lands

Federal lands other than National Forests, including lands administered by the U.S. Department of the Interior's Bureau of Land Management and Bureau of Indian Affairs, and miscellaneous Federal agencies, and lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Productive-reserved Forest Land

Productive public forest land withdrawn from timber utilization through statute or administrative regulation.

Removals

Volume of live sound timber removed from the growing stock inventory including timber products and logging residue.

Sawtimber Trees

Live trees of commercial species, at least 11.0 inches in diameter at breast height. Softwood trees must contain at least one 12-foot saw log with a top diameter of not less than 6 inches inside bark; hardwood trees must contain at least one 8-foot saw log with a top diameter of not less than 8 inches inside bark. At least 25 percent of the board-foot volume in a tree must be free of defect for either softwoods or hardwoods.

Sawtimber Volume

Net volume of the saw-log portion of live sawtimber trees in board feet.

Softwoods

Coniferous trees, usually evergreen, with needles or scalelike leaves.

Timber Removals

The net volume of growing stock trees removed from the inventory by harvesting; cultural operations, such as stand improvement; land clearing; or changes in land use.

Unproductive Forest Land

Forest land incapable of yielding crops of industrial wood because of adverse site conditions. Includes sterile or poorly drained forest land, subalpine forests, and steep rocky areas where topographic conditions are likely to prevent management for timber production.

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1974
USDA FOREST SERVICE RESOURCE BULLETIN PNW-54

Forest Statistics for the Upper Koyukuk River, Alaska, 1971

KARL M. HEGG

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE — FOREST SERVICE
PORTLAND, OREGON

Foreword

This Resource Bulletin is a summation of the findings of the first intensive inventory of that part of the Koyukuk River drainage lying north of the Arctic Circle. Included within the 741,710-acre inventory are areas being considered for inclusion in one of the four national conservation systems—National Forest, Park, Wildlife, and Wild and Scenic Rivers. The North Slope oil pipeline corridor also passes through the inventory area.

The work on this project began in 1969 with acquisition of aerial photography by the Bureau of Land Management (BLM), U.S. Department of Interior. A cooperative effort by the Bureau of Land Management and the Forestry Sciences Laboratory of the Pacific Northwest Forest and Range Experiment Station completed the photo interpretation and field work in 1971.

Participants in the field and office work included: Keith Hutchison, Karl Hegg, and Ronald Dippold, from the U.S. Forest Service; Carl Jeglum, John Stephanson, Jim Murray, Mel Mehl, and Dan Baird from the BLM; and Craig Lindh from the Alaska Division of Economic Development. Data processing was handled by John Berger and assistants at Portland.

Forest Survey, authorized by the McSweeney-McNary Act in 1928 and extended to Alaska in 1954, is a nationwide effort conducted at various locations to obtain information on forest lands—their extent, condition, volume, growth, and depletion. The first inventory of interior Alaska was begun in 1956 and completed in 1962. This was an extremely extensive inventory, and Forest Survey has subsequently defined areas having commercial forest concentrations for which more intensive inventories are desirable. In addition to the Koyukuk River unit, other areas that have been more intensively inventoried and for which reports are available or pending are: Susitna Valley,[1] Kuskokwim River, Copper River, Tanana/Fairbanks, Tuxedni Bay, and the Norton Bay Indian Reservation.

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[1]Karl M. Hegg. Forest resources of the Susitna Valley, Alaska. USDA Forest Service Resource Bulletin PNW-32, 42 p. Pacific Northwest Forest and Range Experiment Station, Portland, Oreg., 1970.

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Abstract

Area and volume statistics from the first intensive forest inventory of the upper Koyukuk River drainage, in north-central Alaska, are given. Observations are made on forest location, description, defect, regeneration, growth, and mortality. Commercial forests, although generally restricted to a narrow band along drainages, were found as far as 70 miles (113 kilometers) north of the Arctic Circle. Commercial forests occupy less than 5 percent of the 742,000-acre inventory area but, despite the northerly latitudes, support an average volume in excess of 1,100 cubic feet per acre (80 cubic meters per hectare).

KEYWORDS: Forest Surveys (Upper Koyukuk River - Alaska).

Highlights

	Acres	Hectares
Total unit area is	741,710	300,170
with forests on	486,828	197,019
with nonforest on	202,316	81,877
with water on	[1]52,566	21,274
Forested areas consist of:		
commercial forest land	34,839	14,099
noncommercial forest land		
- more than 800 cubic feet per acre	7,828	3,168
- less than 800 cubic feet per acre	444,161	179,752
Commercial forest composition is:		
Sawtimber	8,209	3,322
Poletimber	16,686	6,753
Seedling/sapling	9,944	4,024
Nonstocked	0	0

Volumes on commercial forest land are:

	Cubic feet	Cubic meters	Board feet	Cubic meters[2]
	Thousands		Thousands	
Total net volume	37,922.5	1,073.2	87,795.6	557.5
Total gross volume	39,869.0	1,128.3	92,104.6	574.4
Annual gross growth	907.6	25.7	3,190.7	8.1
Annual net mortality	721.0	20.4	2,134.9	13.3

[1] By Bureau of Census definition 17,615 acres would be classified as water.

[2] Volume of roundwood in softwood trees 9.0-inch d.b.h. and larger and hardwood trees 11.0-inch d.b.h. and larger.

Observations

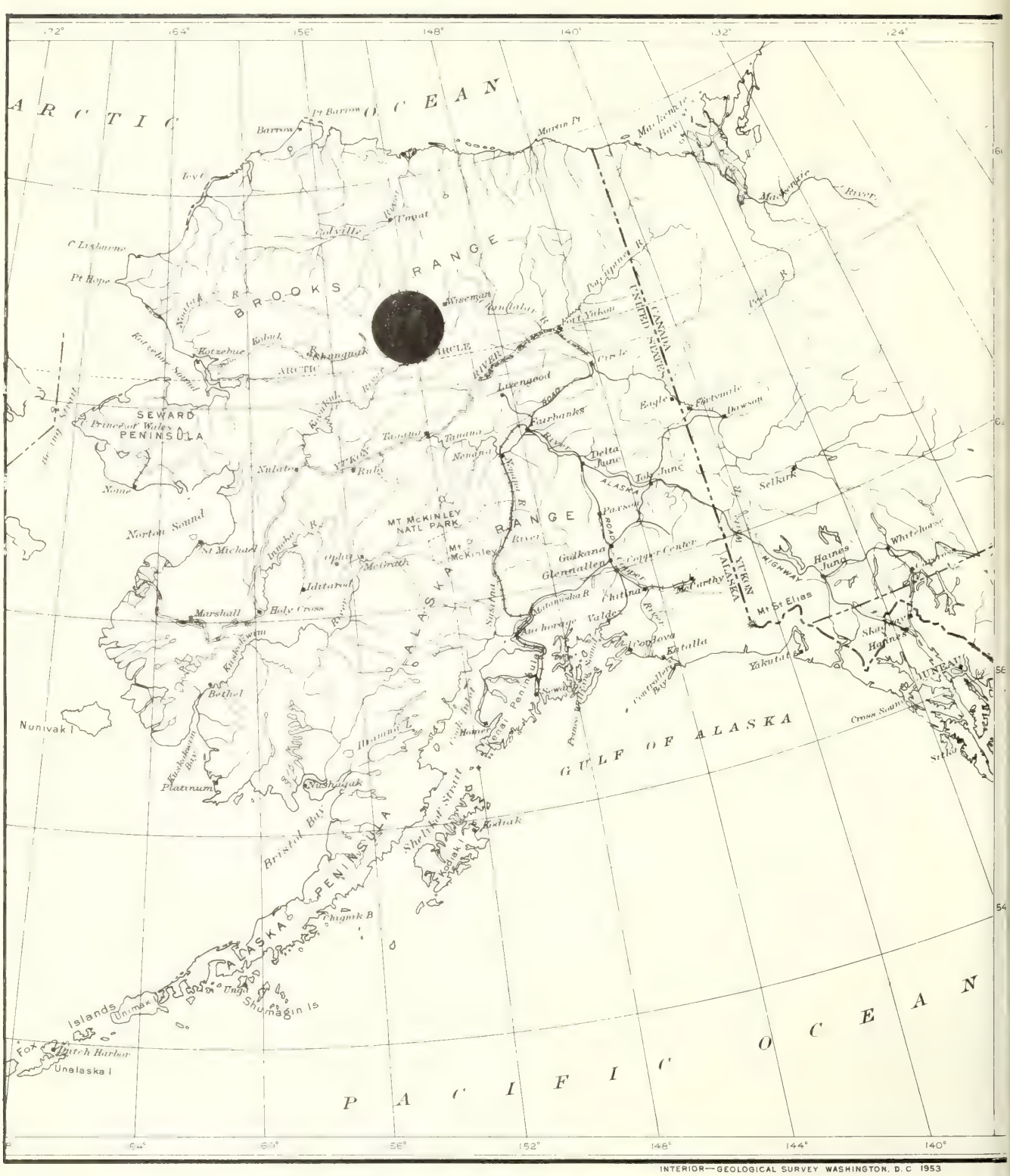
AREA AND LOCATION

The Koyukuk unit lies north of the Arctic Circle and about 225 miles northwest of Fairbanks (fig. 1). It is an area where a fan-shaped series of tributaries rising deep in the Brooks Range join to make up the mainstream of the Koyukuk River. Several of these rivers are of such a wild and primitive nature as to be considered for National Wild River status. The entire area is under study for possible inclusion in the National Forest or Park system. The unit area of 741,710 acres consisting of narrow strips straddling the Koyukuk and its tributaries is but a small part of the area drained by this river system (fig. 2).

FOREST DESCRIPTION

The Koyukuk unit is extensively forested, although forests with commercial potential are restricted to a narrow strip adjacent to drainages (fig. 3). Most of the acreage in these strips is occupied by white spruce with primary balsam poplar stands on newly built-up river bars (fig. 4). Paper birch stands, sometimes in mixture with balsam poplar and white spruce, are found on some of the south-facing slopes and occasionally on other sites after a burn. Aspen was seen in the area, usually as a minor species associated with birch. However, aspen was not found at any of our field locations. The aspen we did see seemed to occur mostly on noncommercial hillside sites and appeared to be of fire origin.

Fire patterns are a fairly prominent feature on the hillsides of Koyukuk drainage with most of the old burns now occupied by noncommercial site hardwoods which we suspect, barring more fire, will be replaced by black spruce. Evidence of fire was not seen on river bottom commercial sites. These sites apparently maintain a humidity level that discourages fire occurrence.


ARCTIC OCEAN
Pt Barrow
Barrow
Wiseman
Fort Yukon
Eagle
Fairbanks
Delta Junction
Tok Junction
Selkirk
Dawson
Whitehorse
Haines Junction
Haines
Skagway
Mt McKinley
Mt St Elias
Valdez
Anchorage
Cordova
Kotalla
Yakutat
JUNEAU
Sitka
Cross Sound
Kotzebue
Nome
Norton Sound
St Michael
Marshall
Holy Cross
Bethel
Nunivak I
Platinum
Nushagak
Kodiak
Unalaska I
Dutch Harbor
Fox Islands
Shumagin Is
Chignik B
Kenai Peninsula
Homer
Seward Peninsula
Prince of Wales Peninsula
Alaska Peninsula
Bristol Bay
Kuskokwim Bay
Kuskokwim R
Yukon R
Tanana R
Koyukuk R
Porcupine R
Mackenzie River
Mackenzie R
Colville R
Colville
Umiat
Point Hope
C Lisburne
Wainwright
Kobuk R
Noatak R
Kotzebue Sound
Arctic Circle
Brooks Range
Alaska Range
Mt McKinley Natl Park
Gulf of Alaska
Pacific Ocean
Alaska Highway
Yukon Territory
Canadian Boundary
Circle
Livengood
Nenana
Tanana
Ruby
Nulato
Iditarod
Ophir
McGrath
Aniak
Kuskokwim R
Susitna R
Matanuska R
Glennallen
Copper Center
Gakkana
Chitina
McCarthy
Valdez
Prince William Sound
Cook Inlet
Kenai
Homer
Seward
Kodiak I
Shelikof Strait
Bristol Bay
Unimak
Unga
Sand Point
Chignik
Kodiak
Alaska Peninsula
Aleutian Islands
Shumagin Islands
Fox Islands
Unalaska
Dutch Harbor
Nunivak I
Platinum
Nushagak
Bethel
Holy Cross
Marshall
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McGrath
Aniak
Kuskokwim R
Yukon R
Tanana R
Koyukuk R
Porcupine R
Mackenzie River

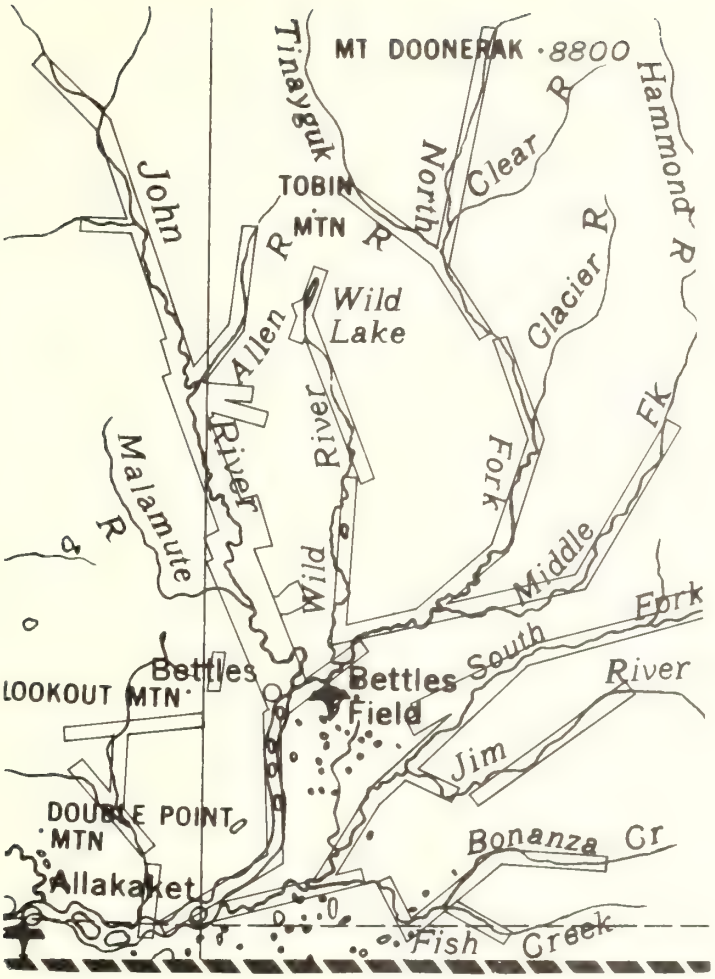

Figure 2.—The Koyukuk Inventory Unit—essentially strips straddling the river network. Actual area included in the unit is outlined.

Figure 3.—Permafrost and restricted drainage confine development of commercial sized trees to narrow bands on the smaller tributaries of the Koyukuk.

Figure 4.—A thrifty balsam poplar stand on the banks of the Koyukuk River

FOREST USES

The use of the timber in this area appears to be mostly for house logs, firewood, and fish drying racks. With a total sawtimber volume of 87.8 million board feet, the maximum allowable cut could not support more than one medium-sized sawmill. This is assuming a mill could draw from a resource scattered within a 50- by 75-mile area. Railroads are nonexistent and roads nearly so, with rivers the main means of surface transport. Physical problems alone make widespread harvesting not feasible; add this to the probable accompanying scenic disruption, and the situation becomes unacceptable to many people.

The inaccessibility of this supply to the State or world markets is evidenced in one recent commercial sale. This sale was made to supply pilings to the North Slope oilfields. But problems of delivering and competition from sources as far distant as Washington State discouraged continuation.

For recreation, esthetics, and the "wilderness experience," inaccessibility may be more an asset than a problem. Bettles and Wiseman have the only scheduled air service in the area and that by small plane. Charter aircraft are available for flights into bush fields and lakes for canoeing, backpacking, hunting, and fishing.

The area has considerable wildlife and several good fishing streams. Part of our forest inventory procedures involved sampling to determine animal use of the forest. At nearly all sample locations, we noted signs of animal use and occupancy. Evidence indicated that moose, caribou, and bear made extensive use of the Koyukuk forests.

DEFECT

Increment borings to obtain age for site determination and our practice of falling sample trees for volume table checks give the field man a chance to see what, if any, defect is found. By extrapolating this knowledge, we estimated the amount of defect in all trees tallied.

On the Koyukuk we found very little decay in white spruce or paper birch but a high decay incidence in balsam poplar. Tables 14 and 14b show a 4-percent loss from gross volume for white spruce and a 24-percent loss for balsam poplar. White spruce is by far the most important species in this area, and fortunately the decay found is a butt rot that seldom extends more than 3 feet up the bole. This butt rot is a brown cubical variety probably caused by the fungus, *Coniophora poteana* Schum. ex Fr. In contrast, nearly all the balsam poplar showed signs of injury and decay if they were approaching or of sawtimber size.

REGENERATION

The possible problem of regeneration in northern and western Alaska has long been recognized. For the Koyukuk at least, there appears to be little cause for concern. The old community of Bettles, abandoned about 10-15 years ago, is fast disappearing under the advance of balsam poplar and birch (fig. 5). These two species also have been successfully regenerating on old burns although these tend to be noncommercial sites. White spruce also appears to be regenerating successfully, although the low ratio of seedlings and saplings shown in table 8 does not bear this out. Only 1,400 acres are shown as being in seedling-sapling stands. However, we noted abundant white spruce regeneration at or near almost every plot location.

Figure 5.—Remnants of old Bettles. Birch and balsam poplar reproduction are rapidly concealing any signs of past human occupancy.

Equally indicative of more than adequate regeneration is that no nonstocked areas were noted on either our photo interpretation or field plot locations.

GROWTH AND MORTALITY

Tables 18 and 19 report gross annual growth (annual mortality volume loss has not been deducted) instead of net annual growth. Our field sample of the commercial forest lands of the Koyukuk measured such large amounts of catastrophic loss as to make any net annual growth tables nearly meaningless. This trend, if continued, would eliminate the Koyukuk stands in a short time. At one plot location, volume loss in the past 5 years is equal to one-third of the present plot volume. Three plots out of a total of 62 established in the commercial forest land stratum fell in a severe riverbank erosion area and accounted for 70 percent of the total mortality volume reported (fig. 6). The present per-acre loss rate is 21 cubic feet; but when the mortality volumes of the 3 plots mentioned are reduced and an average based on the other 59 sample plots is assigned, the average volume loss per acre is reduced to 8.5 cubic feet. We feel that a larger sample would confirm this reduction.

Figure 6.—Stream bank erosion is a major contributor to tree mortality in this area.

The data in table 18 yield a gross annual growth figure of 26.1 cubic feet per acre. By extrapolating from the calculations in the preceding paragraph, this growth would be reduced to 17.6 cubic feet per acre net—about what would be expected of the area.

The annual gross growth of 31 cubic feet per acre (27 cubic feet net) in the operable noncommercial strata (see "Terminology") is also unusually high. Apparently, ingrowth, at a rate of 11 cubic feet per acre, has inflated the growth of this strata. Ingrowth is the movement of the total cubic- or board-foot volume of a tree as it grows into the poletimber or sawtimber size. This may occur periodically in quite large amounts as a result of stands recovering from fire.

Survey Methods

The estimates of area and timber volumes are based on a double sampling procedure.[3] Enough points to satisfy specific levels of statistical precision were uniformly distributed on aerial photographs. These points (1 acre in size) were classified on photos by land type, forest type, and volume strata. A subsample was then drawn from all land types and reexamined on the photos. All subsample points originally classified as commercial forest land as well as any other subsample points questionably classified were visited on the ground.

For the Koyukuk, we interpreted 3,122 photo points and reexamined 528 noncommercial and nonforest points. This reexamination was used as the equivalent of a ground check and yielded 16 questionable points. These with the 62 commercial forest subsamples totaled 78 locations actually checked on the ground. The ground plot was located at the exact same point as was established on the photo. At each ground location a 10-point cluster of plots was measured. A 40-factor, basal-area gage was used to select sample trees at each point for detailed measurements of size and vigor. Through data processing procedures, the total sample and the individual tree volumes were expanded to obtain the various area and volume data needed or specified. However, the tables herein depart from the standard Forest Survey tables in that

[3] C. A. Bickford. The sampling design used in the forest survey of the Northeast. Journal of Forestry 50: 290-293, 1952.

we added a noncommercial forest category called "operable"—areas with more than 800 gross cubic feet per acre in poletimber and sawtimber trees. During the initial inventory of interior Alaska we found that much noncommercial forest land had a relatively high per-acre volume. When more intensive inventories were begun in the mid-1960's, we and our cooperators agreed that some of this noncommercial strata had potential value as a commercial wood supply. By extrapolation from cutting minimums of 3 cords per acre used in the Lake States and Canada, we established 9 cords or 800 cubic feet per acre as a prudent level for Alaska. This threefold increase in the minimum economic operating level should help compensate for the higher production and shipping costs in Alaska.

The area and volume in this classification, although considered adequate for some cutting operations, should not be included in allowable cut computations. Future studies may show, through logging or other silvicultural practices, whether these marginal sites can be managed as commercial forest land. None of the reported areas and volumes (whether classed as commercial or other) should be used to calculate an allowable cut without first considering all possible management and forest land use alternatives.

Sampling Error

The reliability of the inventory is expressed in terms of relative sampling errors.

		Design sampling error	Sampling error achieved	Sampling error of total area or volume reported
			Percent	
Area	Commercial forest land, per million acres	3.0	3.0	±16.0
	Noncommercial forest land, per million acres	10.0	4.5	± 6.6
Volume	Commercial forest land, per billion cubic feet	5.0	3.7	±19.0
	Commercial forest land, growth per billion cubic feet—gross	5.0	.6	±20.0[4]

[4] A gross growth sampling error is used in place of the net growth error. Our mortality sampling error has a high bias, which we attribute to an unusual catastrophic loss, and its effect is to make our net growth sampling error nearly meaningless.

For the Koyukuk River unit, we are reporting 37.9 million cubic feet of growing-stock-volume ±19 percent. This means that unless a 1 in 3 chance has occurred, the true total cubic-foot volume lies between 30.7 and 45.1 million cubic feet.

In all instances we more than achieved our design sampling error.

Principal Alaska Tree Species

Softwoods:	
White spruce	*Picea glauca* (Moench) Voss
Black spruce	*Picea mariana* (Mill.) B.S.P.
Tamarack	*Larix laricina* (Du Roi) K. Koch
Hardwoods:	
Paper birch	*Betula papyrifera* Marsh.
Balsam poplar	*Populus balsamifera* L.
Quaking aspen	*Populus tremuloides* Michx.
Black cottonwood	*Populus trichocarpa* Torr. & Gray

Terminology

Allowable cut.—The volume of timber that would be cut on commercial forest land during a given period under specified management plans for sustained production such as those in effect on National Forests.

Area condition class.—A classification of commercial forest land based upon stocking of desirable trees and other conditions affecting current and prospective timber growth.

Code	Area Condition Classification
10	Areas 100 percent or more stocked with desirable trees and not overstocked. Stands in this category generally do not require any treatment at present to maintain high level of growth.
20	Areas 100 percent or more stocked with desirable trees and overstocked. Stands in this category need a treatment such as thinning to produce maximum levels of growth of desirable trees.
30	Areas 60 to 100 percent stocked with desirable trees, with less than 30 percent of the area controlled by acceptable growing-stock trees, cull trees, inhibiting vegetation, slash, or nonstockable conditions. Stands in this category generally have conditions favorable for natural improvement of stocking without special treatment.
40	Areas 60 to 100 percent stocked with desirable trees, with 30 percent or more of the area controlled by other trees (or overstocked areas) and/or conditions that ordinarily prevent occupancy by desirable trees. Stands in this category generally have little prospect for improvement in desirable tree stocking without special treatment such as thinning, cull tree removal, etc.
50	Areas less than 60 percent stocked with desirable trees, but with 100 percent or more stocking with growing-stock trees. Stands in this category generally have little prospect for improved desirable tree stocking without special treatment. Stands almost to rotation age would usually not be treated.

60 Areas less than 60 percent stocked with desirable trees, but with 60 to 100 percent stocking with growing-stock trees. Stands in this category generally have little prospect for improved desirable tree stocking without special treatment such as timber stand improvement or planting.

70 Areas less than 60 percent stocked with desirable trees and with less than 60 percent stocking with growing-stock trees. Stands in this category generally have little prospect for improved desirable tree or growing-stock stocking without treatment such as site preparation and regeneration, etc.

Commercial species.—Trees presently or prospectively suitable for industrial wood products.

Cull.—Portions of a tree that are unusable for industrial wood products, because of rot, form, or other defect.

Cull trees.—Live trees of sawtimber or poletimber size that are unmerchantable for saw logs now or prospectively because of defect, rot, or species.

Rough trees: Live trees of commercial species 5.0-inch and larger d.b.h. that do not contain a saw log now or prospectively primarily because of roughness or poor form.

Rotten trees: Live trees of commercial species 5.0-inch and larger d.b.h. that do not contain a saw log now or prospectively primarily because of rot.

Forest land.—Land at least 16.7 percent stocked by forest trees of any size, or formerly having such tree cover, and not currently developed for nonforest use.

Commercial forest land: Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood under management.)

Noncommercial forest land: Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions (producing less than 20 cubic feet per acre per year), and productive forest land withdrawn from commercial timber use through statute or administrative regulation.

Noncommercial operable—noncommercial forest land presently carrying a gross volume in excess of 800 cubic feet per acre.

Noncommercial inoperable—noncommercial forest land presently carrying a gross volume of less than 800 cubic feet per acre.

Growing-stock trees.—Sawtimber trees, poletimber trees, saplings, and seedlings; that is, all live commercial trees except cull trees.

Desirable trees: Growing-stock trees having no serious defects in quality limiting present or prospective use, relatively high vigor, and containing no pathogens that may result in death or serious deterioration before rotation age. They include the type of trees forest managers aim to grow; that is, the trees left in silvicultural cutting or favored in cultural operations.

Acceptable trees: Trees meeting the specifications for growing stock but not qualifying as desirable trees.

Hardwoods.—Dicotyledonous trees, usually broad-leaved and deciduous. Alaska hardwood tree species are paper birch, quaking aspen, black cottonwood, and balsam poplar.

Inhibiting vegetation.—Cover sufficiently dense to prevent establishment of tree seedlings.

International ¼-inch rule.—A formula rule used to determine the log and tree volume in board feet.[5] The ¼-inch kerf is a modified form and one of the official rules of the U.S. Forest Service.

Land area.—The area of dry land and land temporarily or partly covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than 120 feet in width; and lakes, reservoirs, and ponds less than 1 acre in area.

[5] Donald Bruce and Francis X. Schumacher. Forest mensuration. 483 p. New York: McGraw-Hill Book Co., 1950.

Local forest types.—A classification of forest land based upon the species forming a plurality of the live tree stocking.

White spruce: Forests in which a plurality of the stand is white spruce. Common associates include birch, aspen, and cottonwood.

Black spruce: Forests in which a plurality of the stand is black spruce. Common associates are paper birch and occasionally white spruce.

Cottonwood/balsam poplar: Forests in which a plurality of the stand is black cottonwood and/or balsam poplar. Common associates include white spruce and birch.

Aspen or paper birch: Forests in which a plurality of the stand is aspen and paper birch, singly or in combination. Common associates include black cottonwood and white spruce.

Log grades.—A classification of logs based on external characteristics as indicators of quality or value.

Mean annual increment (MAI).—A measure of the volume of wood produced on 1 acre during 1 year. Forest Survey minimum standard for commercial forest land is the ability to produce 20 cubic feet per acre per year.

Mortality.—Number or sound-wood volume of live trees dying from natural causes during a specified period.

Net annual growth of growing stock.—The annual change in volume of sound wood in live sawtimber and poletimber trees during a specified period.

Net annual growth of sawtimber.—The annual change in net board-foot volume of live sawtimber trees during a specified period.

Net volume.—The gross volume of a tree less deductions for rot, sweep, or other defect affecting product use.

Growing-stock volume: The net volume of sound wood in the bole of growing-stock trees 5.0 inches and larger in diamater at breast height, from stump to a minimum 4.0-inch top outside bark or to the point where the central stem breaks into limbs.

Noncommercial species.—Tree species of typically small size, poor form, or inferior quality which normally do not develop into trees suitable for industrial wood products.

Nonforest land.—Land that does not qualify as forest land. Includes land that has never supported forests and lands formerly forested where forest use is precluded by development for nonforest uses, such as crops, improved pasture, residential areas, and city parks. Also includes improved roads and certain areas of water classified by the Bureau of the Census as land. Unimproved roads, streams, canals, and nonforest strips in forest areas must be more than 120 feet wide, and clearings in forest areas must be more than 1 acre in size, to qualify as nonforest land.

Nonstockable.—Areas of forest land not capable of supporting forest growth, because of the presence of rock, water, etc.

Salvable dead trees.—Standing dead trees that are considered currently or potentially merchantable by regional standards. A poletimber tree must be more than one-half sound (cubic measure); a sawtimber tree more than one-third sound (board measure).

Saw log.—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight, and with a minimum diameter inside bark for softwoods of 6 inches (8 inches for hardwoods).

Saw-log portion.—That part of the bole of sawtimber trees between the stump and the saw-log top.

Saw-log top.—The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw-log top is 7.0-inch d.o.b. for softwoods and 9.0-inch d.o.b. for hardwoods.

Site classes.—A classification of forest land in terms of inherent capacity to grow crops of industrial wood.

Softwoods.—Coniferous trees, usually evergreen, having needles or scalelike leaves.

Stocking.—The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

Overstocked areas: Areas where growth of trees is significantly reduced by excessive numbers of trees.

Nonstocked areas: Commercial forest

lands less than 16.7 percent stocked with growing-stock trees.

Stand-size classes.—A classification of forest land based on the size class of the growing stock present; that is, sawtimber, poletimber, or saplings and seedlings.

Sawtimber stands: Stands at least 16.7 percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands: Stands at least 16.7 percent stocked with growing-stock trees, of which half or more of this stocking is in poletimber and sawtimber trees, with poletimber stocking exceeding that of sawtimber.

Sapling-seedling stands: Stands at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is sapling and seedlings.

Tree-size classes.—A classification based on the diameter of the tree at breast height (4½ feet above the ground on the uphill side of the tree):

Sawtimber-size tree:

Softwood tree of 9.0-inch d.b.h. and larger.

Hardwood tree of 11.0-inch d.b.h. and larger.

Poletimber-size tree:

Softwood tree of 5.0- to 8.9-inch d.b.h.

Hardwood tree of 5.0- to 10.9-inch d.b.h.

Sapling-size tree: A tree of 1.0- to 4.9-inch d.b.h.

Seedling-size tree: A tree of less than 1.0-inch d.b.h.

Upper-stem portion.—That part of the main stem or fork of sawtimber trees above the sawlog top to a minimum top diameter of 4.0 inches outside bark or to the point where the main stem or fork breaks into limbs.

Water.—*Bureau of the Census:* Streams, sloughs, estuaries, and canals more than ⅛ of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

Forest Survey: The same as the Bureau of the Census, except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

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Metric Conversions

The Forest Survey Handbook requires that the data in the following tables be in the form in common usage in the United States, that is, acres and cubic and board feet. However, to ease the use of these tables internationally and because the United States appears to be shifting to the metric system, the following conversion factors are given:

1 acre	= 0.4047 hectare
1 hectare	= 2.47 acres
1 cubic foot	= 0.0283 cubic meter
1 cubic meter	= 35.3145 cubic feet
1 cubic foot per acre	= 0.06997 cubic meter per hectare
1 cubic meter per hectare	= 14.29 cubic feet per acre
20 cubic feet per acre	= 1.3994 cubic meters per hectare
1 square foot basal area per acre	= 0.2296 square meter per hectare
1 square meter basal area per hectare	= 4.356 square feet per acre

Table 1.—Area by productivity and land class, Koyukuk River, Alaska, 1971

Land class	Thousand acres
Forest land:	
Commercial	34.8
Noncommercial:	
Operable	7.8
Inoperable	444.2
Total noncommercial	452.0
Total forest land	486.8
Non forest land	[1]254.9
Total area	741.7

[1] *Includes 17,615 acres classified as water by Bureau of Census and 34,951 acres defined as water by Forest Survey.*

Table 2.—Area of commercial and operable noncommercial forest land, by stand-size class, Koyukuk River, Alaska, 1971

(Thousand acres)

Stand-size class	Total	Commercial	Operable noncommercial
Sawtimber stands	12.1	8.2	3.9
Poletimber stands	20.6	16.7	3.9
Seedling and sapling stands	9.9	9.9	0
Nonstocked areas	0	0	0
Total	42.6	34.8	7.8

Table 3.—Area of commercial and operable noncommercial forest land, by stand-volume class, Koyukuk River, Alaska, 1971

(Thousand acres)

Stand volume (board feet per acre)[1]	Total	Commercial	Operable noncommercial
0-1,499	21.8	19.3	2.5
1,500-2,999	6.7	5.5	1.2
3,000-4,999	9.8	5.7	4.1
5,000-6,999	.2	.2	0
More than 7,000	4.1	4.1	0
Total	42.6	34.8	7.8

[1] *Net volume, International ¼-inch rule.*

Table 4.—Area of commercial and operable noncommercial forest land, by stand-size and stand-volume classes, Koyukuk River, Alaska, 1971

(Thousand acres)

Stand volume (net cubic feet per acre)	Stand-size class				
	Total	Non-stocked	Sapling-seedling	Poletimber	Sawtimber
0-299	7.1	0	7.1	0	0
300-799	8.2	0	2.8	4.1	1.3
800-1,499	16.5	0	0	11.0	5.5
1,500-2,199	7.7	0	0	5.3	2.4
More than 2,200	3.1	0	0	.2	2.9
Total	42.6	0	9.9	20.6	12.1

Table 5.—Area of commercial forest land by area condition class, Koyukuk River, Alaska, 1971

Area condition class		Thousand acres
0	Areas 100 percent or more stocked with desirable trees and not overstocked.	0
20	Areas 100 percent or more stocked with desirable trees and overstocked.	1.4
30	Areas 60 to 100 percent stocked with desirable trees, and with less than 50 percent of the area controlled by acceptable growing stock trees, cull trees, inhibiting vegetation, slash, or nonstockable conditions.	2.9
40	Areas 60 to 100 percent stocked with desirable trees and with 30 percent or more of the area controlled by other trees (or overstocked areas) and/or conditions that ordinarily prevent occupancy by desirable trees.	2.8
50	Areas less than 60 percent stocked with desirable trees, but with 100 percent or more stocking with growing-stock trees.	7.0
60	Areas less than 60 percent stocked with desirable trees, but with 60 to 100 percent stocking with growing-stock trees.	15.0
70	Areas poorly stocked with desirable trees, and poorly stocked with growing-stock trees.	5.7
All classes		34.8

Table 6—Area of commercial forest land, by site class, Koyukuk River, Alaska, 1971

Site class (cubic feet)	Thousand acres
165 or more[1]	0
120 to 165	0
85 to 120	0
50 to 120	0
Less than 50	34.8
Total	34.8

[1] *Potential yield, mean annual increment.*

Table 7.—Area of noncommercial forest land, by forest type, Koyukuk River, Alaska, 1971

(Thousand acres)

Forest type	Total	Operable[1]	Inoperable[2]
Black spruce	444.2	0	444.2
White spruce	7.8	7.8	0
Cottonwood	0	0	0
Paper birch	0	0	0
Total	452.0	7.8	444.2

[1] *Operable noncommercial forest land is defined as areas presently supporting more than 800 cubic feet of volume (gross).*
[2] *All inoperable noncommercial forest land is assumed to be black spruce and paper birch.*

Table 8.—Area of commercial forest land, by forest type and stand-size class, Koyukuk River, Alaska, 1971

(Thousand acres)

Local forest type	Total	Stand-size class		
		Sapling-seedling	Poletimber	Sawtimber
White spruce	21.0	1.4	11.4	8.2
Cottonwood	12.4	7.1	5.3	-
Paper birch	1.4	1.4	-	-
Total	34.8	9.9	16.7	8.2

Table 9.—Area of commercial forest land, by stand age and stand-size class, Koyukuk River, Alaska, 1971

(Thousand acres)

Stand age (years)	Stand-size class			
	Total	Sapling-seedling	Poletimber	Sawtimber
Nonstocked	—	—	—	—
1-10	1.4	1.4	0	0
10-20	1.4	1.4	0	0
20-30	1.4	1.4	0	0
30-40	1.4	0	1.4	0
40-50	2.8	2.8	0	0
50-60	5.5	2.9	2.6	0
60-70	0	0	0	0
70-80	0	0	0	0
80-90	1.4	0	1.4	0
90-100	2.9	0	2.9	0
100-120	5.4	0	2.7	2.7
120-140	1.4	0	1.4	0
140-160	0	0	0	0
160-180	4.1	0	2.9	1.2
180-200	.3	0	0	.3
200-300	2.6	0	0	2.6
300 and over	0	0	0	0
Mixed ages	2.8	0	1.4	1.4
Total	34.8	9.9	16.7	8.2

Table 9a.—Area of operable noncommercial forest land, by stand age and stand-size class, Koyuku River, Alaska, 1971

(Thousand acres)

Stand age (years)	Stand-size class			
	Total	Sapling-seedling	Poletimber	Sawtimber
Nonstocked	—	—	—	—
1-10	0	0	0	0
10-20	0	0	0	0
20-30	0	0	0	0
30-40	0	0	0	0
40-50	0	0	0	0
50-60	0	0	0	0
60-70	0	0	0	0
70-80	0	0	0	0
80-90	0	0	0	0
90-100	1.2	0	1.2	0
100-120	0	0	0	0
120-140	1.4	0	1.4	0
140-160	0	0	0	0
160-180	3.8	0	1.3	2.5
180-200	0	0	0	0
200-300	1.4	0	0	1.4
300 and over	0	0	0	0
Mixed ages	0	0	0	0
Total	7.8	0	3.9	3.9

Table 10.—Number of growing-stock trees on commercial forest land, by species and diameter class, Koyukuk River, Alaska, 1971

(Thousand trees)

Species	Diameter class (inches at breast height)												
	Total	1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
White spruce	5,260	1,159	1,323	955	799	583	275	92	51	14	4	5	0
Paper birch	2,035	426	1,065	375	136	33	0	0	0	0	0	0	0
Balsam poplar	5,916	2,312	1,338	1,158	746	273	84	5	0	0	0	0	0
Total	13,211	3,897	3,726	2,488	1,681	889	359	97	51	14	4	5	0

Table 11.—Number of growing-stock trees 5.0-inch d.b.h. and larger on commercial and operable noncommercial forest land, by species and 5-foot height class, Koyukuk River, Alaska, 1971

(Thousand trees)

5-foot height classes	Total	Species		
		White spruce	Paper birch	Balsam poplar
1-30	1,063	558	145	360
31-35	970	506	186	278
36-40	1,014	606	117	291
41-45	1,253	566	109	578
46-50	926	509	61	356
51-55	808	535	46	227
56-60	594	390	12	192
61-65	263	208	0	55
66-70	164	164	0	0
71-75	122	122	0	0
76-80	88	88	0	0
81-85	25	25	0	0
86-90	20	20	0	0
91-95	23	23	0	0
96-100	5	5	0	0
101+	4	4	0	0
Total	7,342	4,329	676	2,337

Table 12.—Net volume of timber on commercial forest land, by class of timber and softwoods and hardwoods, Koyukuk River, Alaska, 1971

(Million cubic feet)

Class of Timber	Total	Softwoods	Hardwoods
Sawtimber trees:			
Saw-log portion	17.8	17.1	.7
Upper-stem portion	1.9	1.5	.4
Total	19.7	18.6	1.1
Poletimber trees	18.2	7.3	10.9
All growing-stock trees	37.9	25.9	12.0
Rough trees	0	0	0
Rotten trees	.3	.1	.2
Salvable dead trees	3.1	3.0	.1
Total	41.3	29.0	12.3

Table 12a.—Net volume of timber on operable noncommercial forest land, by class of timber and softwoods and hardwoods, Koyukuk River, Alaska, 1971

(Million cubic feet)

Class of Timber	Total	Softwoods	Hardwoods
Sawtimber trees:			
Saw-log portion	4.6	4.5	0.1
Upper-stem portion	.4	.4	0
Total	5.0	4.9	.1
Poletimber trees	4.7	4.3	.4
All growing-stock trees	9.7	9.2	.5
Rough trees	.1	.1	0
Rotten trees	0.	0	0
Salvable dead trees	.2	.2	0
Total	10.0	9.5	.5

Table 13.—Net volume of growing stock on commercial forest land, by species and diameter class, Koyukuk River, Alaska, 1971

(Million cubic feet)

Species	Diameter class (inches at breast height)										
	Total	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-26.9	27.0+
Softwoods:											
White spruce	25.9	2.4	4.9	6.8	5.4	2.9	1.9	0.8	0.3	0.5	0
Total	25.9	2.4	4.9	6.8	5.4	2.9	1.9	.8	.3	.5	0
Hardwoods:											
Paper birch	1.7	.9	.5	.3	0	0	0	0	0	0	0
Balsam poplar	10.3	2.9	3.9	2.4	1.0	.1	0	0	0	0	0
Total	12.0	3.8	4.4	2.7	1.0	.1	0	0	0	0	0
Total, all species	37.9	6.2	9.3	9.5	6.4	3.0	1.9	.8	.3	.5	0

Table 13a.—Net volume of growing stock on commercial and operable noncommercial forest land, by species and diameter class, Koyukuk River, Alaska, 1971

(Million cubic feet)

Species	Diameter class (inches at breast height)										
	Total	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-26.9	27.0+
Softwoods:											
White spruce	35.1	3.9	7.7	9.3	6.8	3.7	2.1	0.8	0.3	0.5	0
Total	35.1	3.9	7.7	9.3	6.8	3.7	2.1	.8	.3	.5	0
Hardwoods:											
Paper birch	2.0	1.1	.5	.3	.1	0	0	0	0	0	0
Balsam poplar	10.5	3.0	4.0	2.4	1.0	.1	0	0	0	0	0
Total	12.5	4.1	4.5	2.7	1.1	.1	0	0	0	0	0
Total, all species	47.6	8.0	12.2	12.0	7.9	3.8	2.1	.8	.3	.5	0

Table 14.—Net volume of sawtimber on commercial forest land, by species and diameter class, Koyukuk River, Alaska, 1971

(Million board feet, International ¼-inch rule)

Species	Diameter class (inches at breast height)								
	Total	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Softwoods:									
White spruce	85.6	26.6	25.3	14.8	10.3	4.2	1.6	2.8	0
Total	85.6	26.6	25.3	14.8	10.3	4.2	1.6	2.8	0
Hardwoods:									
Paper birch	0	0	0	0	0	0	0	0	0
Balsam poplar	2.2	0	1.9	.3	0	0	0	0	0
Total	2.2	0	1.9	.3	0	0	0	0	0
Total, all species	87.8	26.6	27.2	15.1	10.3	4.2	1.6	2.8	0

Table 14a.—Net volume of sawtimber on commercial and operable noncommercial forest land, by species and diameter class, Koyukuk River, Alaska 1971

(Million board feet, International ¼-inch rule)

Species	Diameter class (inches at breast height)								
	Total	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Softwoods:									
White spruce	106.3	36.0	32.2	18.6	10.9	4.2	1.6	2.8	0
Total	106.3	36.0	32.2	18.6	10.9	4.2	1.6	2.8	0
Hardwoods:									
Paper birch	.3	0	.3	0	0	0	0	0	0
Balsam poplar	2.2	0	1.9	.3	0	0	0	0	0
Total	2.5	0	2.2	.3	0	0	0	0	0
Total, all species	108.8	36.0	34.4	18.9	10.9	4.2	1.6	2.8	0

Table 14b.—Gross volume of sawtimber on commercial forest land, by species and diameter class, Koyukuk River, Alaska, 1971

(Million board feet, International ¼-inch rule)

Species	Diameter class (inches at breast height)								
	Total	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Softwoods:									
White spruce	89.2	27.2	26.2	15.5	11.1	4.6	1.7	2.9	0
Total	89.2	27.2	26.2	15.5	11.1	4.6	1.7	2.9	0
Hardwoods:									
Paper birch	0	0	0	0	0	0	0	0	0
Balsam poplar	2.9	0	2.6	.3	0	0	0	0	0
Total	2.9	0	2.6	.3	0	0	0	0	0
Total, all species	92.1	27.2	28.8	15.8	11.1	4.6	1.7	2.9	0

Table 14c.—Gross volume of sawtimber on commercial and operable noncommercial forest land, by species and diameter class, Koyukuk River, Alaska, 1971

(Million board feet, International ¼-inch rule)

Species	Diameter class (inches at breast height)								
	Total	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+
Softwoods:									
White spruce	111.3	37.3	33.2	19.9	11.8	4.6	1.6	2.9	0
Total	111.3	37.3	33.2	19.9	11.8	4.6	1.6	2.9	0
Hardwoods:									
Paper birch	.3	0	.3	0	0	0	0	0	0
Balsam poplar	2.8	0	2.5	.3	0	0	0	0	0
Total	3.1	0	2.8	.3	0	0	0	0	0
Total, all species	114.4	37.3	36.0	20.2	11.8	4.6	1.6	2.9	0

Table 15.—Net volume of sawtimber on commercial forest land, by species and log grade, Koyukuk River, Alaska, 1971

(Million board feet, International ¼-inch rule)

Species	Total	Log grade 1	2	3	4[1]
Softwoods:					
White spruce[2]	85.6	0	1.2	67.9	16.5
Total	85.6	0	1.2	67.9	16.5
Hardwoods:					
Paper birch[3]	0	0	0	0	0
Balsam poplar[3]	2.2	0	.3	1.8	.1
Total	2.2	0	.3	1.8	.1
Total, all species	87.8	0	1.5	69.7	16.6

[1] *Local use logs.*

[2] *Graded by "Official Grading Rules for Northern Hardwoods and Softwoods." Northern Hemlock and Hardwood Manufacturers Association, 1959.*

[3] *Graded by "Hardwood Log Grades for Standard Lumber." USDA Forest Service, Forest Products Laboratory, 1961.*

Table 15a.—Net volume of sawtimber on commercial and operable noncommercial forest land, by species and log grade, Koyukuk River, Alaska, 1971

(Million board feet, International ¼-inch rule)

Species	Total	Log grade 1	2	3	4[1]
Softwoods:					
White spruce	106.3	0	1.2	82.7	22.4
Total	106.3	0	1.2	82.7	22.4
Hardwoods:					
Paper birch	.3	0	0	.3	0
Balsam poplar	2.2	0	.3	1.8	.1
Total	2.5	0	.3	2.1	.1
Total, all species	108.8	0	1.5	84.8	22.5

[1] *Local use logs.*

Table 16.—Net volume of growing stock on commercial forest land, by forest type and stand-size class, Koyukuk River, Alaska, 1971

(Million cubic feet)

Local forest type	Stand-size class			
	Total	Sapling-seedling	Poletimber	Sawtimber
White spruce	28.4	0	12.9	15.5
Cottonwood	8.8	1.3	7.5	0
Paper birch	.7	.7	0	0
Total	37.9	2.0	20.4	15.5

Table 16a.—Net volume of growing stock on operable noncommercial forest land, by forest type and stand-size class, Koyukuk River, Alaska, 1971

(Million cubic feet)

Local forest type	Stand-size class			
	Total	Sapling-seedling	Poletimber	Sawtimber
White spruce	9.2	0	4.3	4.9
Cottonwood	.3	0	.2	.1
Paper birch	.2	0	.2	0
Total	9.7	0	4.7	5.0

Table 17.—Net volume of sawtimber on commercial forest land, by forest type and stand-size class, Koyukuk River, Alaska, 1971

(Million board feet, International ¼-inch rule)

Local forest type	Stand-size class			
	Total	Sapling-seedling	Poletimber	Sawtimber
White spruce	81.1	0	22.9	58.2
Cottonwood	6.4	.3	6.1	0
Paper birch	.3	.3	0	0
Total	87.8	.6	29.0	58.2

Table 17a.—Net volume of sawtimber on operable noncommercial forest land, by forest type and stand-size class, Koyukuk River, Alaska, 1971

(Million board feet, International ¼-inch rule)

Local forest type	Stand-size class			
	Total	Sapling-seedling	Poletimber	Sawtimber
White spruce	21.0	0	6.9	14.1
Cottonwood	0	0	0	0
Paper birch	0	0	0	0
Total	21.0	0	6.9	14.1

Table 18.—Gross annual growth of growing stock, by forest-land class and species, Koyukuk River, Alaska, 1971[1]

(Thousand cubic feet)

Species	Forest-land class		
	Total	Commercial	Operable noncommercial
Softwoods:			
White spruce	787.0	550.7	236.3
Total	787.0	550.7	236.3
Hardwoods:			
Paper birch	106.8	103.7	3.1
Balsam poplar	255.0	253.2	1.8
Total	361.8	356.9	4.9
Total, all species	1,148.8	907.6	241.2

[1] *Because of catastrophic losses that occurred on commercial forest land, we have not deducted annual mortality in constructing this table. See text for details.*

Table 19.—Net annual growth of sawtimber, by forest-land class and species, Koyukuk River, Alaska 1971[1]

(Thousand board feet, International ¼-inch rule)

Species	Forest-land class		
	Total	Commercial	Operable noncommercial
Softwoods:			
White spruce	3,247.7	2,913.8	333.9
Total	3,247.7	2,913.8	333.9
Hardwoods:			
Paper birch	2.1	0	2.1
Balsam poplar	276.9	276.9	0
Total	279.0	276.9	2.1
Total, all species	3,526.7	3,190.7	336.0

[1] *Because of catastrophic losses that occurred on commercial forest land, we have not deducted annual mortality in constructing this table. See text for details.*

Table 20.—Annual mortality of growing stock, by species and forest-land class, Koyukuk River, Alaska, 1971

(Thousand cubic feet)

Species	Forest-land class		
	Total	Commercial	Operable noncommercial
Softwoods:			
White spruce	710.1	686.9	23.2
Total	710.1	686.9	23.2
Hardwoods:			
Paper birch	0	0	0
Balsam poplar	34.2	34.2	0
Total	34.2	34.2	0
Total, all species	744.3	721.1	23.2

Table 21.—Annual mortality of sawtimber, by species and forest-land class, Koyukuk River, Alaska, 1971

(Thousand board feet, International ¼-inch rule)

Species	Forest-land class		
	Total	Commercial	Operable noncommercial
Softwoods:			
White spruce	2,239.0	2,134.9	104.1
Total	2,239.0	2,134.9	104.1
Hardwoods:			
Paper birch	0	0	0
Balsam poplar	0	0	0
Total	0	0	0
Total, all species	2,239.0	2,134.9	104.1

Table 22.—Annual mortality of growing stock, by forest-land class, cause, and softwoods and hardwoods, Koyukuk River, Alaska, 1971

(Thousand cubic feet)

Cause	Commercial forest land			Operable noncommercial forest land		
	Total	Softwoods	Hardwoods	Total	Softwoods	Hardwoods
Fire	0	0	0	0	0	0
Insects	31.4	31.4	0	0	0	0
Disease	72.7	57.9	14.8	0	0	0
Windthrow	0	0	0	0	0	0
Other[1]	513.0	493.6	19.4	23.2	23.2	0
Unknown	104.0	104.0	0	0	0	0
Total	721.1	686.9	34.2	23.2	23.2	0

[1] Erosion of stream banks.

Table 23.—Annual mortality of sawtimber by forest-land class, cause, and softwoods and hardwoods, Koyukuk River, Alaska, 1971

(Thousand board feet, International ¼-inch rule)

Cause	Commercial forest land			Operable noncommercial forest land		
	Total	Softwoods	Hardwoods	Total	Softwoods	Hardwoods
Fire	0	0	0	0	0	0
Insects	0	0	0	0	0	0
Disease	272.7	272.7	0	0	0	0
Windthrow	0	0	0	0	0	0
Other[1]	1,600.7	1,600.7	0	104.1	104.1	0
Unknown	261.5	261.5	0	0	0	0
Total	2,134.9	2,134.9	0	104.1	104.1	0

[1] *Erosion of stream banks.*

Hegg, Karl M.
1974. Forest statistics for the upper Koyukuk River, Alaska, 1971. USDA For. Serv. Resour. Bull. PNW-54. 26 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

This resource bulletin reports the findings of the first intensive forest inventory of the upper Koyukuk River drainage in north-central Alaska. Brief comments are included on forest location and description, defect, regeneration, growth, and mortality. Standard Forest Survey tables are presented plus a limited amount of data from an operable noncommercial class.

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The mission of the PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION is to provide the knowledge, technology, and alternatives for present and future protection, management, and use of forest, range, and related environments.

Within this overall mission, the Station conducts and stimulates research to facilitate and to accelerate progress toward the following goals:

1. Providing safe and efficient technology for inventory, protection, and use of resources.
2. Development and evaluation of alternative methods and levels of resource management.
3. Achievement of optimum sustained resource productivity consistent with maintaining a high quality forest environment.

The area of research encompasses Oregon, Washington, Alaska, and, in some cases, California, Hawaii, the Western States, and the Nation. Results of the research will be made available promptly. Project headquarters are at:

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The FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

USDA Forest Service
Resource Bulletin PNW-55

December 1974

1973 OREGON TIMBER HARVEST

by

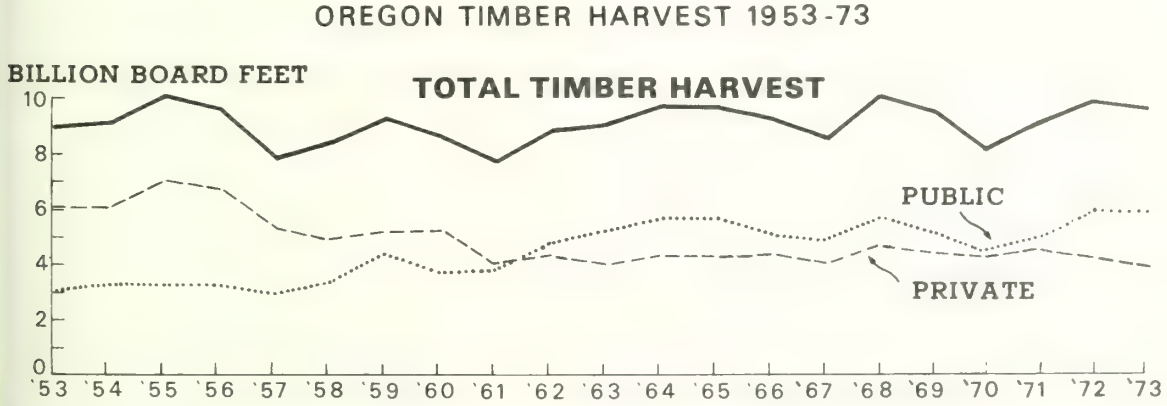
J. D. Lloyd, Jr., *Supervisory Forester*

The 1973 Oregon timber harvest of 9.36 billion board feet was 265 million board feet (2.8 percent) below the 1972 harvest. The greater portion of the decrease occurred in eastern Oregon where timber harvest dropped 9.4 percent compared with 0.9 percent in western Oregon.

Most of the decrease in total harvest occurred on private lands; the 1973 harvest was 7.9 percent (309 million board feet) below that of 1972. The harvest on private lands in western Oregon decreased 5.1 percent and in eastern Oregon, 20.5 percent. Forest industry harvest for the State decreased 12.7 percent (430 million board feet); however, harvest from other private lands increased 22.7 percent (122 million board feet).

The data for private harvest in eastern Oregon for 1973 were collected by the Oregon State Department of Revenue; in western Oregon, by the State Forester as in previous years.

The harvest from all public lands in 1973 was 0.8 percent (44 million board feet) above the 1972 harvest. In western Oregon the public harvest increased 2.3 percent (100 million board feet); however, in eastern Oregon it decreased 3.9 percent (57 million board feet). The largest share of the total public increase occurred on Bureau of Land Management and State lands--5.7 percent and 17.1 percent, respectively. The harvest on National Forest lands decreased 2.7 percent.



OREGON TIMBER HARVEST, 1953–73

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION

Robert E. Buckman, Director
FOREST SERVICE

P.O. Box 3141 Portland, Oregon 97208
U.S. Department of Agriculture

Timber Harvest by Ownership in the State of Oregon, 1973[1/]

(In thousands of board feet, Scribner log scale)

Half-State and county	Private[2]			Bureau of Land Management[3]	National Forest[4]	Indian[5]	Other Federal[6]	State[6]	Other public[6]	Total
	Forest industry	Other	Total							
Western Oregon:										
Benton	61,978	30,665	92,643	57,844	16,775	--	--	7,784	--	175,046
Clackamas	92,765	56,497	149,262	49,322	262,380	--	--	3,248	3,142	467,354
Clatsop	144,174	19,631	163,805	--	--	--	--	62,988	4,127	230,920
Columbia	80,591	30,018	110,609	--	--	--	--	7,801	6,599	125,009
Coos	326,732	32,928	359,660	195,122	66,182	--	--	62,306	3,540	686,810
Curry	64,650	21,689	86,339	26,813	138,620	--	--	1,864	--	253,636
Douglas	536,262	51,669	587,931	426,124	453,938	--	--	30,967	744	1,499,704
Hood River	2,260	565	2,825	--	38,649	--	--	--	--	41,474
Jackson	94,529	17,225	111,754	124,251	182,919	--	--	1,664	360	420,948
Josephine	7,006	12,583	19,589	89,132	61,042	--	--	2,457	4,785	177,005
Lane	541,706	75,266	616,972	214,208	834,847	--	--	8,940	85	1,675,052
Lincoln	88,299	18,059	106,358	51,563	129,514	--	--	6,851	--	294,286
Linn	251,323	141,720	393,043	71,435	219,793	--	--	8,972	--	693,243
Marion	12,834	6,685	19,519	12,840	38,894	--	--	1,289	--	72,542
Multnomah	1,086	9,962	11,048	27	49,443	--	--	--	2,356	62,874
Polk	39,343	15,234	54,577	31,602	4,413	--	--	9,280	--	99,872
Tillamook	124,033	5,211	129,244	63,376	88,624	--	--	58,995	519	340,758
Washington	6,800	10,355	17,155	222	--	--	--	2,591	--	19,968
Yamhill	9,363	8,500	17,863	41,035	12,317	--	--	--	9,332	80,547
Total	2,485,734	564,462	3,050,196	1,454,916	2,598,350	--	--	277,997	35,589	7,417,048
Eastern Oregon:										
Baker	--	7,453	7,453	2,759	57,056	--	--	75	--	67,343
Crook	752	4,347	5,099	4,674	49,712	--	--	--	--	59,485
Deschutes	140	--	140	902	148,690	--	--	--	--	149,732
Gilliam	--	--	--	--	--	--	--	--	--	--
Grant	28,743	12,623	41,366	2,030	247,186	--	--	--	--	290,582
Harney	1,655	389	2,044	—	73,189	--	--	--	--	75,233
Jefferson	6,398	515	6,913	—	35,319	19,233	--	--	--	61,465
Klamath	252,834	11,116	263,950	30,369	208,741	--	--	7,142	--	510,202
Lake	118,219	10,550	128,769	—	97,578	--	--	--	--	226,347
Malheur	—	1,661	1,661	376	--	--	--	--	--	2,037
Morrow	5,863	--	5,863	--	19,338	--	--	--	--	25,201
Sherman	--	--	--	--	--	--	--	--	--	--
Umatilla	5,350	7,373	12,723	--	53,559	--	--	--	---	66,282
Union	13,569	16,575	30,144	692	75,791	--	--	--	--	106,627
Wallowa	16,325	9,877	26,202	2,485	57,705	—	--	319	26	86,737
Wasco	4,421	4,080	8,501	80	58,994	75,330	--	--	--	142,905
Wheeler	12,165	6,968	19,133	1,524	54,567	--	--	2,180	--	77,404
Total	466,434	93,527	559,961	45,891	1,237,425	94,563	--	9,716	26	1,947,582
Total Oregon	2,952,168	657,989	3,610,157	1,500,807	3,835,775	94,563	--	287,713	35,615	9,364,630

[1] Includes volume removed as logs and poles and piling but not volume removed for woodcutting operations.

[2] Compiled by State Forester for western Oregon and by Oregon State Department of Revenue for eastern Oregon.

[3] Compiled by U.S. Bureau of Land Management.

[4] Compiled by U.S. Forest Service, Region 6.

[5] Compiled by U.S. Bureau of Indian Affairs.

[6] Compiled by State Forester.

Prepared by Forest Survey Project, Pacific Northwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture, Portland, Oregon.

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1974
USDA FOREST SERVICE RESOURCE BULLETIN PNW-56

TIMBER RESOURCE STATISTICS FOR OREGON

JANUARY 1, 1973

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Grover A. Choate

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
PORTLAND, OREGON

ABSTRACT

Timber resource statistics as of January 1, 1973, for the State of Oregon show total land area, commercial timberland area, and growing stock and sawtimber inventory volumes by county and owner group. Growth and removals are shown by Forest Survey inventory unit for 1972. Each National Forest is updated to January 1, 1973, as well as each Bureau of Land Management District in western Oregon.

Keywords: Forest surveys (Oregon), resources (timber), statistics (timber).

PREFACE

For an area as large as Oregon, a complete field inventory of the timber resources is usually not possible within a single year nor is it feasible to reinventory every year to maintain current statistics. Yet, with rapid change in the forest situation, it is desirable to have current statistics readily available.

Statistics in this report update many of the 1970 statistics shown for the State of Oregon in the last national timber appraisal (USDA Forest Service 1973). The tables also show data for counties or county groups. Area and volume statistics are as of January 1, 1973; growth and removals are for 1972. These statistics were updated by Forest Survey, a nationwide project of the Forest Service.

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UPDATING PROCEDURES

The methods described here were used to update inventory data to January 1, 1973. Data were from field surveys made since 1962. National Forest lands were inventoried by National Forest Administration, the Bureau of Land Management inventoried its own lands in western Oregon, and all other lands were inventoried by Forest Survey. Data for all lands for the State were assembled by Forest Survey in five inventory unit reports (Berger 1968; Hazard and Metcalf 1964, 1965; Metcalf and Hazard 1964).[1/]

A stand projection model, TRAS--Timber Resource Analysis System (Larson and Goforth 1970), used nationwide by Forest Survey, was used to update these data to January 1, 1973. This model projects stands by calculating annual change in numbers of trees by 2-inch diameter classes. Ingrowth and changes in the land base and in utilization are allowed for in the model. Results are annual statements of inventory volume, net growth, removals, and mortality in board and cubic feet.

Using this model, we updated each National Forest and Bureau of Land Management unit, as well as three ownership classes--other public, forest industry, and farmer and miscellaneous private--separately by inventory unit. In general, updating was done by extending to 1973 the updated 1970 estimates made for the study, "The Outlook for Timber in the United States" (USDA Forest Service 1973), except eastern Oregon and National Forests in western Oregon. The two inventory units in eastern Oregon were updated from the date of the latest inventory; 1964 for the Central Oregon unit, 1969 for the Blue Mountain unit. Data from 1972 inventories were used for the Willamette and Mount Hood National Forests in western Oregon.

In updating the "Outlook" data from 1970, we adjusted area and volume to account for changes since that time. Area was adjusted to account for nominal losses of commercial forest land for roads, powerlines, reservoirs, etc. Major shifts in public lands between ownerships or from one National Forest to another were also accounted for. Volume was reduced to account for timber cutting by ownership within inventory unit. Information on cut from private, county, and municipal and State lands came from the Oregon State Department of Forestry. Cut on other public lands came from the U.S. Department of the Interior--Bureau of Land Management and Bureau of Indian Affairs--and the National Forest Administration. With this information we reduced the volume for each county at the time of original inventory by the volume of cut from year to year through 1972. The residual volumes then provided the basis for determining county proportions as of 1973. The 1973 total inventory volumes by ownership for each inventory unit were then proportioned among the counties within units.

The inventory updating procedure provides estimates of total net annual growth for each ownership at the inventory unit level. The procedure assumes the same average growth rates for all counties within each ownership. Available information and

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[1/] Charles L. Bolsinger and John M. Berger. Timber resource statistics for the Blue Mountain area of Oregon. (In preparation for publication by the Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.)

procedures are not considered adequate to allocate growth to counties. Use of the average growth rate for a survey unit appears reasonable in view of the general homogeneity of each unit with respect to growing conditions and stand characteristics.

Updated statistics are less reliable and less detailed than estimates provided by new inventories. Updating, in addition to carrying along the sampling errors associated with the original survey, does not allow for evaluation of some conditions that change from year to year. For instance, lack of data on annual cut and mortality by species precludes updating of volume and growth by species in greater detail than by softwood and hardwoods. Short-term updated statistics are, of course, generally more reliable than long-term ones. County statistics are subject to considerable sampling error. In general, the larger the forest area in the county, the more reliable the estimate.

METRIC CONVERSIONS

1,000 acres	= 404.71 hectares
1,000 cubic feet	= 28.3 cubic meters
1 cubic foot per acre	= 0.07 cubic meter per hectare
1 square-foot basal area per acre	= 0.2296 square meter per hectare
1 mile	= 1.609 kilometers
1 foot	= 30.480 centimeters
1 inch	= 2.540 centimeters

Table 1.--Land area by major class of land by inventory unit and county, Oregon, January 1, 1973

(In thousand acres)

Inventory unit and county	Total land area[1/]	Forest land					Nonforest land
		Total	Commercial	Productive reserved	Deferred	Unproductive	
WESTERN OREGON							
Northwest Oregon:							
Clackamas	1,206	924	881	1	3	39	282
Clatsop	515	487	462	5	--	20	28
Columbia	409	340	333	(3/)	--	7	69
Hood River	335	286	237	5	(3/)	44	49
Marion	746	397	341	12	--	44	349
Multnomah	271	127	111	1	--	15	144
Polk	470	273	271	1	--	1	197
Tillamook	714	644	637	6	--	1	70
Washington	458	249	249	(3/)	--	--	209
Yamhill	455	253	253	(3/)	--	--	202
Total	5,579	3,980	3,775	31	3	171	1,599
West-central Oregon:							
Benton	427	271	270	--	--	1	156
Lane	2,920	2,485	2,320	119	--	46	435
Lincoln	631	574	572	1	--	1	57
Linn	1,466	1,095	951	58	--	86	371
Total	5,444	4,425	4,113	178	--	134	1,019
Southwest Oregon:							
Coos	1,027	891	873	3	--	15	136
Curry	1,041	1,005	760	50	--	195	36
Douglas	3,240	2,870	2,763	2	--	105	370
Jackson	1,800	1,539	1,305	2	--	232	261
Josephine	1,040	922	795	5	--	122	118
Total	8,148	7,227	6,496	62	--	669	921
Total western Oregon	19,171	15,632	14,384	271	3	974	3,539
EASTERN OREGON							
Central Oregon:							
Crook	1,907	955	426	--	--	529	952
Deschutes	1,940	1,270	898	44	--	328	670
Gilliam	773	--	--	--	--	--	773
Jefferson	1,148	555	349	17	--	189	593
Klamath	3,821	2,958	2,435	194	46	283	863
Lake	5,268	1,551	1,210	13	--	328	3,717
Sherman	531	--	--	--	--	--	531
Wasco	1,524	550	414	1	--	135	974
Wheeler	1,092	507	312	2	--	193	585
Total	18,004	8,346	6,044	271	46	1,985	9,658
Blue Mountain:							
Baker	1,964	717	571	5	--	141	1,247
Grant	2,900	1,951	1,532	20	--	399	949
Harney	6,506	777	413	--	--	364	5,729
Malheur	6,311	97	7	--	--	90	6,214
Morrow	1,318	206	198	--	--	8	1,112
Umatilla	2,065	519	459	4	--	56	1,546
Union	1,301	754	652	10	4	88	547
Wallowa	2,034	981	706	72	5	198	1,053
Total	24,399	6,002	4,538	111	9	1,344	18,397
Total eastern Oregon	42,403	14,348	10,582	382	55	3,329	28,055
Total Oregon	61,574	29,980	24,966	653	58	4,303	31,594

1/ U.S. Bureau of the Census, Land and Water Area of the United States, 1960. (Revised July 1964.)

2/ Includes [illegible] as defined by Forest Survey standards but deferred by land use decision at the time of the survey.

3/ Less than 500 acres.

Table 2.--Area of commercial timberland by ownership class and by inventory unit and county, Oregon, January 1, 1973

(In thousand acres)

Inventory unit and county	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
			WESTERN OREGON		
Northwest Oregon					
Clackamas	881	468	96	117	200
Clatsop	462	--	142	225	95
Columbia	333	--	18	198	117
Hood River	237	155	43	24	15
Marion	341	140	50	38	113
Multnomah	111	53	4	--	54
Polk	271	1	38	134	98
Tillamook	637	89	347	128	73
Washington	249	--	95	8	146
Yamhill	253	26	41	92	94
Total	3,775	932	874	964	1,005
West-central Oregon:					
Benton	270	16	70	15	169
Lane	2,320	1,127	296	574	323
Lincoln	572	165	41	259	107
Linn	951	337	108	237	269
Total	4,113	1,645	515	1,085	868
Southwest Oregon:					
Coos	873	54	219	300	300
Curry	760	397	51	167	145
Douglas	2,763	882	648	724	509
Jackson	1,305	433	301	322	249
Josephine	795	302	268	63	162
Total	6,496	2,068	1,487	1,576	1,365
Total western Oregon	14,384	4,645	2,876	3,625	3,238
			EASTERN OREGON		
Central Oregon:					
Crook	426	338	11	57	20
Deschutes	898	745	26	74	53
Gilliam	--	--	--	--	--
Jefferson	349	119	136	59	35
Klamath	2,435	1,293	115	699	328
Lake	1,210	870	4	263	73
Sherman	--	--	--	--	--
Wasco	414	153	199	15	47
Wheeler	312	134	9	80	89
Total	6,044	3,652	500	1,247	645
Blue Mountain					
Baker	571	437	17	10	107
Grant	1,532	1,276	19	97	140
Harney	413	392	1	4	16
Malheur	7	3	4	(1/)	--
Morrow	198	111	1	48	38
Umatilla	459	282	27	49	101
Union	652	429	6	67	150
Wallowa	706	411	9	105	181
Total	4,538	3,341	84	380	733
Total eastern Oregon	10,582	6,993	584	1,627	1,378
Total Oregon	24,966	11,638	3,460	5,252	4,616

1/ Less than 500 acres.

Table 3.--Area of commercial timberland, net volume, net annual growth, and removals of growing stock and sawtimber, by ownership class and by softwoods and hardwoods, Oregon[1/]

Ownership class		Growing stock			Sawtimber (International 1/4-inch rule)			Sawtimber (Scribner rule)		
Species	Area	Volume	Growth	Removals	Volume	Growth	Removals	Volume	Growth	Removals
		cubic feet	-- Thousand cubic feet --		Million board feet	-- Thousand board feet --			--	
					WESTERN OREGON					
National Forest:	4,645									
Softwoods		28,099	182,700	432,700	165,668	1,071,000	2,774,400	133,492	866,000	2,256,000
Hardwoods		936	11,800	2,700	5,149	80,000	23,000	3,599	53,000	15,000
All species		29,035	194,500	435,400	170,817	1,151,000	2,797,400	137,091	919,000	2,271,000
Other public:	2,876									
Softwoods		10,977	142,300	234,500	64,502	735,000	1,588,000	55,971	613,000	1,431,000
Hardwoods		1,214	48,600	3,000	3,970	166,000	17,000	3,906	165,000	16,000
All species		12,191	190,900	237,500	68,472	901,000	1,605,000	59,877	778,000	1,447,000
Forest industry:	3,625									
Softwoods		9,147	160,700	517,400	52,527	635,000	3,229,000	41,641	468,000	2,601,000
Hardwoods		1,510	43,700	8,200	5,891	134,000	39,000	5,732	130,000	37,000
All species		10,657	204,400	525,600	58,418	769,000	3,268,000	47,373	598,000	2,638,000
Farmer and miscellaneous private:	3,238									
Softwoods		5,897	183,400	85,700	28,859	815,000	495,000	22,713	620,000	405,000
Hardwoods		2,764	68,800	1,300	9,771	299,000	6,000	9,517	292,000	6,000
All species		8,661	252,200	87,000	38,630	1,114,000	501,000	32,230	912,000	411,000
Total western Oregon:	14,384									
Softwoods		54,120	669,100	1,270,300	311,556	3,256,000	8,086,400	253,817	2,567,000	6,693,000
Hardwoods		6,424	172,900	15,200	24,781	679,000	85,000	22,754	640,000	74,000
All species		60,544	842,000	1,285,500	336,337	3,935,000	8,171,400	276,571	3,207,000	6,767,000
					EASTERN OREGON					
National Forest:	6,993									
Softwoods		17,043	237,300	194,000	79,894	1,033,000	1,253,500	69,801	891,000	1,131,700
Hardwoods		8	--	--	22	--	--	19	--	--
All species		17,051	237,300	194,000	79,916	1,033,000	1,253,500	69,820	891,000	1,131,700
Other public:	584									
Softwoods		1,930	34,900	23,700	8,691	142,000	136,000	7,559	123,000	124,000
Hardwoods		1	--	--	2	--	--	2	--	--
All species		1,931	34,900	23,700	8,693	142,000	136,000	7,561	123,000	124,000
Forest industry:	1,627									
Softwoods		2,508	52,700	109,000	9,437	189,000	610,000	8,074	162,000	556,000
Hardwoods		1	--	--	--	--	--	--	--	--
All species		2,509	52,700	109,000	9,437	189,000	610,000	8,074	162,000	556,000
Farmer and miscellaneous private:	1,378									
Softwoods		1,637	51,600	22,900	5,247	179,600	124,000	4,367	150,500	111,300
Hardwoods		14	2/-100	--	43	400	--	42	500	--
All species		1,651	51,500	22,900	5,290	180,000	124,000	4,409	151,000	111,300
Total eastern Oregon:	10,582									
Softwoods		23,118	376,500	349,600	103,269	1,543,600	2,123,500	89,801	1,326,500	1,922,700
Hardwoods		24	2/-100	--	67	400	--	63	500	--
All species		23,142	376,400	349,600	103,336	1,544,000	2,123,500	89,864	1,327,000	1,922,700
Total Oregon:	24,966									
Softwoods		77,238	1,045,600	1,619,900	414,825	4,799,600	10,209,900	343,618	3,893,500	8,615,700
Hardwoods		6,448	172,800	15,200	24,848	679,400	85,000	22,817	640,500	74,000
All species		83,686	1,218,400	1,635,100	439,673	5,479,000	10,294,900	366,435	4,534,000	8,689,700

1/ As of January 1, 1973, for area and volume and for 1972 for growth and removals.

2/ Negative net growth is the result of mortality exceeding gross growth.

Table 4.--Area of commercial timberland, net volume, net annual growth, and removals of growing stock, by ownership class and by softwoods and hardwoods, Oregon [1/]

(Metric equivalents of area and cubic volumes of table 3)

Ownership class / Species	Area	Volume	Growth	Removals
	Thousand hectares	*Million cubic meters*	*- - - Thousand cubic meters - - -*	
		WESTERN OREGON		
National Forest:	1,880			
Softwoods		796	5,174	12,254
Hardwoods		27	334	76
All species		823	5,508	12,330
Other public:	1,164			
Softwoods		311	4,030	6,641
Hardwoods		34	1,376	85
All species		345	5,406	6,726
Forest industry:	1,467			
Softwoods		259	4,551	14,653
Hardwoods		43	1,238	232
All species		302	5,789	14,885
Farmer and miscellaneous private:	1,310			
Softwoods		167	5,194	2,427
Hardwoods		78	1,949	37
All species		245	7,143	2,464
Total western Oregon:	5,821			
Softwoods		1,533	18,949	35,975
Hardwoods		182	4,897	430
All species		1,715	23,846	36,405
		EASTERN OREGON		
National Forest:	2,830			
Softwoods		483	6,720	5,494
Hardwoods		(2/)	--	--
All species		483	6,720	5,494
Other public:	236			
Softwoods		54	988	671
Hardwoods		(2/)	--	--
All species		54	988	671
Forest industry:	659			
Softwoods		71	1,493	3,087
Hardwoods		(2/)	--	--
All species		71	1,493	3,087
Farmer and miscellaneous private:	558			
Softwoods		46	1,461	649
Hardwoods		1	(3/)-3	--
All species		47	1,458	649
Total eastern Oregon:	4,283			
Softwoods		654	10,662	9,901
Hardwoods		1	(3/)-3	--
All species		655	10,659	9,901
Total Oregon:	10,104			
Softwoods		2,187	29,611	45,876
Hardwoods		183	4,894	430
All species		2,370	34,505	46,306

1/ As of January 1, 1973, for area and volume and for 1972 for growth and removals.

2/ Less than 50,000 cubic meters.

3/ Negative net growth is the result of mortality exceeding gross growth.

Table 5.--Area of commercial timberland, net volume, net annual growth, and removals of growing stock and sawtimber, by National Forest and by softwoods and hardwoods, Oregon [1/]

National Forest		Growing stock			Sawtimber (International 1/4-inch rule)			Sawtimber (Scribner rule)		
Species	Area	Volume	Growth	Removals	Volume	Growth	Removals	Volume	Growth	Removals
	Thousand acres	*Million cubic feet*	*- Thousand cubic feet -*		*Million board feet*	*- Thousand board feet -*		*Million board feet*	*- Thousand board feet -*	
Deschutes	1,268									
Softwoods		2,742	38,600	25,000	13,543	212,000	160,000	12,128	190,000	141,000
Hardwoods		--	--	--	--	--	--	--	--	--
All species		2,742	38,600	25,000	13,543	212,000	160,000	12,128	190,000	143,000
Fremont	928									
Softwoods		1,894	23,700	25,200	9,088	89,000	157,000	7,959	76,000	142,000
Hardwoods		--	--	--	--	--	--	--	--	--
All species		1,894	23,700	25,200	9,088	89,000	157,000	7,959	76,000	142,000
Klamath: [2/]	26									
Softwoods		89	900	--	504	3,000	--	472	3,000	--
Hardwoods		5	200	--	7	--	--	7	--	--
All species		94	1,100	--	511	3,000	--	479	3,000	--
Malheur	1,179									
Softwoods		2,674	38,500	31,800	12,746	144,000	210,000	11,141	122,000	190,000
Hardwoods		1	--	--	1	--	--	1	--	--
All species		2,675	38,500	31,800	12,747	144,000	210,000	11,142	122,000	190,000
Mount Hood	877									
Softwoods		5,499	42,400	51,000	30,439	240,000	376,900	24,714	198,000	321,700
Hardwoods		33	500	100	102	3,000	--	71	2,000	--
All species		5,532	42,900	51,100	30,541	243,000	376,900	24,785	200,000	321,700
Ochoco:	669									
Softwoods		1,526	17,100	15,500	8,492	74,000	104,000	7,532	64,000	94,000
Hardwoods		1	--	--	3	--	--	3	--	--
All species		1,527	17,100	15,500	8,495	74,000	104,000	7,535	64,000	94,000
Rogue River [2/]	501									
Softwoods		2,423	18,800	42,100	13,117	96,000	262,000	10,435	76,000	218,000
Hardwoods		30	200	--	44	--	--	44	--	--
All species		2,453	19,000	42,100	13,161	96,000	262,000	10,479	76,000	218,000
Siskiyou [2/]	721									
Softwoods		2,765	19,100	45,300	16,708	75,000	296,000	13,636	57,000	243,000
Hardwoods		321	5,900	400	1,316	63,000	4,000	330	16,000	3,000
All species		3,086	25,000	45,700	18,024	98,000	300,000	14,566	90,000	246,000
Siuslaw:	587									
Softwoods		3,677	37,100	64,700	24,110	259,000	439,000	19,407	217,000	361,000
Hardwoods		517	4,200	2,200	3,589	50,000	19,000	2,489	33,000	12,000
All species		4,194	41,300	66,900	27,699	309,000	458,000	21,896	250,000	373,000
Umatilla [3/]	793									
Softwoods		2,477	29,100	24,500	10,786	141,000	160,000	9,185	118,000	145,000
Hardwoods		--	--	--	--	--	--	--	--	--
All species		2,477	29,100	24,500	10,786	141,000	160,000	9,185	118,000	145,000
Umpqua	872									
Softwoods		5,534	32,200	85,200	31,589	184,000	523,000	25,113	147,000	409,000
Hardwoods		3	--	--	11	--	--	7	--	--
All species		5,537	32,200	85,200	31,600	184,000	523,000	25,120	147,000	409,000
Wallowa-Whitman	1,172									
Softwoods		3,111	53,600	38,800	12,899	212,000	255,000	11,000	180,000	200,000
Hardwoods		2	--	--	9	--	--	7	--	--
All species		3,113	53,600	38,800	12,908	212,000	255,000	11,007	180,000	200,000
Willamette	1,234									
Softwoods		8,835	42,600	155,600	53,353	279,000	953,000	43,427	283,000	772,000
Hardwoods		31	800	--	89	4,000	--	59	4,000	--
All species		8,866	43,400	155,600	53,442	283,000	953,000	43,486	287,000	772,000
Winema:	811									
Softwoods		1,896	26,300	22,100	8,188	96,000	132,000	7,144	82,000	114,000
Hardwoods		--	--	--	--	--	--	--	--	--
All species		1,896	26,300	22,100	8,188	96,000	132,000	7,144	82,000	114,000
All National Forests	11,638									
Softwoods		45,142	420,000	626,700	245,562	2,104,000	4,027,900	203,192	2,[illegible]	[illegible]
Hardwoods		944	11,800	2,700	5,171	80,000	23,000	3,[illegible]	[illegible]	[illegible]
All species		46,086	431,800	629,400	250,733	2,184,000	4,050,900	[illegible]	[illegible]	[illegible]

1/ As of January 1, 1973, for area and volume and for 1972 for growth and removals. These figures show total volume and growth of [illegible] commercial forest land base in each National Forest. On some of these acres timber removals are limited because of other [illegible] Forests, may result in growth exceeding removals. For most Forests removals exceed growth and will not [illegible] forests. As a result, these figures, while providing point-in-time data, do not provide a basis for evaluating [illegible]

2/ Most of the Klamath National Forest and portions of the Rogue River and Siskiyou National Forests are [illegible]

3/ A portion of the Umatilla National Forest is in Washington.

Table 6.--Area of commercial timberland, net volume, net annual growth, and removals of growing stock and sawtimber, by Bureau of Land Management District and by softwoods and hardwoods, Oregon 1/

District		Growing stock			Sawtimber (International 1/4-inch rule)			Sawtimber (Scribner rule)		
Species	Area	Volume	Growth	Removals	Volume	Growth	Removals	Volume	Growth	Removals
	Thousand acres	*Million cubic feet*	*--- Thousand cubic feet ---*		*Million board feet*	*--- Thousand board feet ---*		*Million board feet*	*--- Thousand board feet ---*	
Salem:	384									
Softwoods		2,021	31,600	44,600	12,914	199,000	329,000	11,300	173,000	303,000
Hardwoods		134	3,800	600	567	20,000	4,000	553	20,000	4,000
All species		2,155	35,400	45,200	13,481	219,000	333,000	11,853	193,000	307,000
Eugene:	309									
Softwoods		1,126	22,200	32,100	6,846	107,000	231,000	5,972	90,000	212,000
Hardwoods		88	3,600	--	260	12,000	--	281	13,000	--
All species		1,214	25,800	32,100	7,106	119,000	231,000	6,253	103,000	212,000
Roseburg:	387									
Softwoods		1,735	8,400	27,900	10,816	46,000	197,000	9,551	41,000	177,000
Hardwoods		137	3,000	100	410	7,000	--	400	7,000	--
All species		1,872	11,400	28,000	11,226	53,000	197,000	9,951	48,000	177,000
Coos Bay:	307									
Softwoods		1,637	13,400	31,600	10,704	66,000	228,000	9,748	58,000	213,000
Hardwoods		204	12,800	100	739	40,000	1,000	733	40,000	1,000
All species		1,841	26,200	31,700	11,443	106,000	229,000	10,481	98,000	214,000
Medford:	645									
Softwoods		2,511	16,600	56,600	13,265	81,000	329,000	11,869	72,000	302,000
Hardwoods		94	4,200	100	176	10,000	--	172	10,000	--
All species		2,605	20,800	56,700	13,441	91,000	329,000	12,041	82,000	302,000
All Districts:	2,032									
Softwoods		9,030	92,200	192,800	54,545	499,000	1,314,000	48,440	434,000	1,207,000
Hardwoods		657	27,400	900	2,152	89,000	5,000	2,139	90,000	5,000
All species		9,687	119,600	193,700	56,697	588,000	1,319,000	50,579	524,000	1,212,000

1/ As of January 1, 1973, for area and volume and for 1972 for growth and removals. Removals exceed growth on every District because Bureau of Land Management forests are predominantly old growth. This will continue until old-growth stands are replaced with young-growth forests. As a result, these figures, while providing point-in-time data, do not provide a basis for evaluating agency management objectives.

Table 7.--*Net volume of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Northwest Oregon, January 1, 1973*

Ownership class	Volume per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Million cubic feet* - - - - - - -		
All growing stock:				
National Forest	6,792	6,330	6,165	165
Other public	3,018	2,638	2,228	410
Forest industry	2,262	2,181	1,863	318
Farmer and miscellaneous private	3,290	3,306	2,178	1,128
All ownerships	3,829	14,455	12,434	2,021
	Board feet	- - - - - - - *Million board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	38,516	35,897	34,988	909
Other public	15,467	13,518	12,219	1,299
Forest industry	9,472	9,131	8,166	965
Farmer and miscellaneous private	13,301	13,368	9,416	3,952
All ownerships	19,050	71,914	64,789	7,125
Sawtimber (Scribner rule):				
National Forest	30,749	28,658	27,938	720
Other public	12,810	11,196	9,932	1,264
Forest industry	7,249	6,988	6,049	939
Farmer and miscellaneous private	10,888	10,942	7,100	3,842
All ownerships	15,307	57,784	51,019	6,765

Table 8.--*Net volume of growing stock and sawtimber on commercial timberland by county and ownership class, Northwest Oregon, January 1, 1973*

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
			Million cubic feet		
All growing stock:					
Clackamas	4,356	3,153	433	151	619
Clatsop	2,038	--	556	1,005	477
Columbia	691	--	46	302	343
Hood River	1,195	919	106	119	51
Marion	1,645	1,162	211	(1/)	272
Multnomah	628	369	24	(1/)	235
Polk	431	9	162	19	241
Tillamook	2,077	599	716	294	468
Washington	471	--	174	(1/)	297
Yamhill	923	119	310	291	303
All counties	14,455	6,330	2,638	2,181	3,306
			Million board feet		
Sawtimber (International 1/4-inch rule):					
Clackamas	23,103	17,425	2,392	648	2,638
Clatsop	9,014	--	2,256	4,431	2,327
Columbia	2,357	--	179	941	1,237
Hood River	6,150	4,922	494	549	185
Marion	8,957	6,612	1,224	(1/)	1,121
Multnomah	3,272	2,070	133	(1/)	1,069
Polk	1,723	60	1,035	60	568
Tillamook	11,669	4,095	3,865	1,332	2,377
Washington	1,667	--	666	(1/)	1,001
Yamhill	4,002	713	1,274	1,170	845
All counties	71,914	35,897	13,518	9,131	13,368
Sawtimber (Scribner rule):					
Clackamas	18,398	13,840	2,007	479	2,072
Clatsop	7,112	--	1,813	3,397	1,902
Columbia	1,834	--	122	690	1,022
Hood River	4,897	3,978	379	403	137
Marion	7,247	5,301	1,000	(1/)	946
Multnomah	2,761	1,741	106	(1/)	914
Polk	1,533	49	920	50	514
Tillamook	9,367	3,192	3,214	1,037	1,924
Washington	1,295	--	526	(1/)	769
Yamhill	3,340	557	1,109	932	742
All counties	57,784	28,658	11,196	6,988	10,942

1/ Combined with farmer and miscellaneous private.

Table 9.--*Net annual growth of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Northwest Oregon, 1972*

Ownership class	Growth per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Thousand cubic feet* - - - - - - -		
All growing stock:				
National Forest	47	43,900	42,300	1,600
Other public	71	62,400	46,100	16,300
Forest industry	74	71,100	58,100	13,000
Farmer and miscellaneous private	126	126,500	87,400	39,100
All ownerships	81	303,900	233,900	70,000
	Board feet	- - - - - - - *Thousand board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	277	258,000	244,000	14,000
Other public	341	298,000	235,000	63,000
Forest industry	331	319,000	268,000	51,000
Farmer and miscellaneous private	550	553,000	373,000	180,000
All ownerships	378	1,428,000	1,120,000	308,000
Sawtimber (Scribner rule):				
National Forest	221	206,000	195,000	11,000
Other public	285	249,000	188,000	61,000
Forest industry	256	247,000	197,000	50,000
Farmer and miscellaneous private	451	453,000	278,000	175,000
All ownerships	306	1,155,000	858,000	297,000

Table 10.--*Removals from growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Northwest Oregon, 1972*

Ownership class	Removals per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - - *Thousand cubic feet* - - - - - - - -		
All growing stock:				
National Forest	64	59,800	59,000	800
Other public	58	50,500	49,300	1,200
Forest industry	151	145,300	141,200	4,100
Farmer and miscellaneous private	19	19,500	18,900	600
All ownerships	73	275,100	268,400	6,700
	Board feet	- - - - - - - - *Thousand board feet* - - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	463	431,400	425,600	5,800
Other public	387	338,000	331,000	7,000
Forest industry	770	742,000	727,000	15,000
Farmer and miscellaneous private	98	98,000	95,000	3,000
All ownerships	426	1,609,400	1,578,600	30,800
Sawtimber (Scribner rule):				
National Forest	384	358,200	354,600	3,600
Other public	338	295,000	288,000	7,000
Forest industry	592	571,000	557,000	14,000
Farmer and miscellaneous private	77	77,000	74,000	3,000
All ownerships	345	1,301,200	1,273,600	27,600

Table 11.--*Net volume of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, West-central Oregon, January 1, 1973*

Ownership class	Volume per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Million cubic feet* - - - - - - -		
All growing stock:				
National Forest	7,188	11,825	11,472	353
Other public	5,252	2,705	2,435	270
Forest industry	3,053	3,312	2,957	355
Farmer and miscellaneous private	2,924	2,538	1,906	632
All ownerships	4,955	20,380	18,770	1,610
	Board feet	- - - - - - - *Million board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	44,349	72,954	70,485	2,469
Other public	30,757	15,840	14,988	852
Forest industry	17,321	18,793	17,466	1,327
Farmer and miscellaneous private	15,372	13,343	10,574	2,769
All ownerships	29,402	120,930	113,513	7,417
Sawtimber (Scribner rule):				
National Forest	35,794	58,881	57,248	1,633
Other public	26,883	13,845	12,989	856
Forest industry	14,010	15,201	13,912	1,289
Farmer and miscellaneous private	12,911	11,207	8,507	2,700
All ownerships	24,103	99,134	92,656	6,478

Table 12.--*Net volume of growing stock and sawtimber on commercial timberland by county and ownership class, West-central Oregon, January 1, 1973*

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
	Million cubic feet				
All growing stock:					
Benton	1,191	72	414	22	683
Lane	11,509	8,045	1,291	1,360	813
Lincoln	2,503	1,107	380	858	158
Linn	5,177	2,601	620	1,072	884
All counties	20,380	11,825	2,705	3,312	2,538
	Million board feet				
Sawtimber (International 1/4-inch rule):					
Benton	6,825	562	2,454	123	3,686
Lane	67,421	48,508	7,500	7,503	3,910
Lincoln	15,846	8,348	2,238	4,602	658
Linn	30,838	15,536	3,648	6,565	5,089
All counties	120,930	72,954	15,840	18,793	13,343
Sawtimber (Scribner rule):					
Benton	5,748	446	2,112	99	3,091
Lane	55,092	39,204	6,568	6,010	3,310
Lincoln	13,020	6,645	1,994	3,774	607
Linn	25,274	12,586	3,171	5,318	4,199
All counties	99,134	58,881	13,845	15,201	11,207

Table 13.--*Net annual growth of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, West-central Oregon, 1972*

Ownership class	Growth per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Thousand cubic feet* - - - - - - -		
All growing stock:				
National Forest	45	73,700	70,300	3,400
Other public	112	57,800	47,900	9,900
Forest industry	70	75,500	62,800	12,700
Farmer and miscellaneous private	84	72,800	57,300	15,500
All ownerships	68	279,800	238,300	41,500
	Board feet	- - - - - - - *Thousand board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	306	504,000	466,000	38,000
Other public	567	292,000	258,000	34,000
Forest industry	269	292,000	247,000	45,000
Farmer and miscellaneous private	532	375,000	289,000	86,000
All ownerships	356	1,463,000	1,260,000	203,000
Sawtimber (Scribner rule):				
National Forest	247	407,000	385,000	22,000
Other public	489	252,000	217,000	35,000
Forest industry	209	227,000	184,000	43,000
Farmer and miscellaneous private	358	311,000	227,000	84,000
All ownerships	291	1,197,000	1,013,000	184,000

Table 14.--*Removals from growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, West-central Oregon, 1972*

Ownership class	Removals per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Thousand cubic feet* - - - - - - -		
All growing stock:				
National Forest	126	206,700	205,300	1,400
Other public	115	59,100	58,200	900
Forest industry	145	157,500	155,700	1,800
Farmer and miscellaneous private	45	39,000	38,500	500
All ownerships	112	462,300	457,700	4,600
	Board feet	- - - - - - - *Thousand board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	792	1,302,200	1,289,600	12,600
Other public	827	426,000	422,000	4,000
Forest industry	944	1,024,000	1,015,000	9,000
Farmer and miscellaneous private	275	239,000	237,000	2,000
All ownerships	727	2,991,200	2,963,600	27,600
Sawtimber (Scribner rule):				
National Forest	641	1,053,900	1,045,900	8,000
Other public	751	387,000	383,000	4,000
Forest industry	768	833,000	825,000	8,000
Farmer and miscellaneous private	228	198,000	196,000	2,000
All ownerships	601	2,471,900	2,449,900	22,000

Table 15.--*Net volume of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Southwest Oregon, January 1, 1973*

Ownership class	Volume per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Million cubic feet* - - - - - - -		
All growing stock:				
National Forest	5,261	10,880	10,462	418
Other public	4,605	6,848	6,314	534
Forest industry	3,277	5,164	4,327	837
Farmer and miscellaneous private	2,064	2,817	1,813	1,004
All ownerships	3,958	25,709	22,916	2,793
	Board feet	- - - - - - - *Million board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	29,964	61,966	60,195	1,771
Other public	26,304	39,114	37,295	1,819
Forest industry	19,349	30,494	26,895	3,599
Farmer and miscellaneous private	8,732	11,919	8,869	3,050
All ownerships	26,109	143,493	133,254	10,239
Sawtimber (Scribner rule):				
National Forest	23,961	49,552	48,306	1,246
Other public	23,427	34,836	33,050	1,786
Forest industry	15,980	25,184	21,680	3,504
Farmer and miscellaneous private	7,385	10,081	7,106	2,975
All ownerships	18,419	119,653	110,142	9,511

Table 16.--*Net volume of growing stock and sawtimber on commercial timberland by county and ownership class, Southwest Oregon, January 1, 1973*

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
	Million cubic feet				
All growing stock:					
Coos	3,479	328	1,426	831	894
Curry	2,974	1,863	224	494	393
Douglas	12,437	5,591	3,108	2,933	805
Jackson	4,410	2,040	1,106	824	440
Josephine	2,409	1,058	984	82	285
All counties	25,709	10,880	6,848	5,164	2,817
	Million board feet				
Sawtimber (International 1/4-inch rule):					
Coos	20,296	2,202	8,489	4,944	4,661
Curry	16,383	10,571	1,300	3,106	1,406
Douglas	72,158	32,371	18,587	17,593	3,607
Jackson	22,172	10,659	5,569	4,464	1,480
Josephine	12,484	6,163	5,169	387	765
All counties	143,493	61,966	39,114	30,494	11,919
Sawtimber (Scribner rule):					
Coos	17,653	2,019	7,609	4,083	3,942
Curry	13,467	8,538	1,175	2,565	1,189
Douglas	59,886	25,802	16,505	14,528	3,051
Jackson	18,313	8,430	4,943	3,688	1,252
Josephine	10,334	4,763	4,604	320	647
All counties	119,653	49,552	34,836	25,184	10,081

Table 17.--*Net annual growth of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Southwest Oregon, 1972*

Ownership class	Growth per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Thousand cubic feet* - - - - - - -		
All growing stock:				
National Forest	37	76,900	70,100	6,800
Other public	48	70,700	48,300	22,400
Forest industry	37	57,800	39,800	18,000
Farmer and miscellaneous private	39	52,900	38,700	14,200
All ownerships	40	258,300	196,900	61,400
	Board feet	- - - - - - - *Thousand board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	188	389,000	361,000	28,000
Other public	209	311,000	242,000	69,000
Forest industry	100	158,000	120,000	38,000
Farmer and miscellaneous private	136	186,000	153,000	33,000
All ownerships	161	1,044,000	876,000	168,000
Sawtimber (Scribner rule):				
National Forest	148	306,000	286,000	20,000
Other public	186	277,000	208,000	69,000
Forest industry	79	124,000	87,000	37,000
Farmer and miscellaneous private	108	148,000	115,000	33,000
All ownerships	132	855,000	696,000	159,000

Table 18.--*Removals from growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Southwest Oregon, 1972*

Ownership class	Removals per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Thousand cubic feet* - - - - - - -		
All growing stock:				
National Forest	82	168,900	168,400	500
Other public	86	127,900	127,000	900
Forest industry	141	222,800	220,500	2,300
Farmer and miscellaneous private	21	28,500	28,300	200
All ownerships	84	548,100	544,200	3,900
	Board feet	- - - - - - - *Thousand board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	514	1,063,800	1,059,200	4,600
Other public	566	841,000	835,000	6,000
Forest industry	953	1,502,000	1,487,000	15,000
Farmer and miscellaneous private	120	164,000	163,000	1,000
All ownerships	550	3,570,800	3,544,200	26,600
Sawtimber (Scribner rule):				
National Forest	415	858,900	855,500	3,400
Other public	514	765,000	760,000	5,000
Forest industry	783	1,234,000	1,219,000	15,000
Farmer and miscellaneous private	100	136,000	135,000	1,000
All ownerships	461	2,993,900	2,969,500	24,400

Table 19.--*Net volume of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Central Oregon, January 1, 1973*

Ownership class	Volume per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Million cubic feet* - - - - - - -		
All growing stock:				
National Forest	2,302	8,406	8,401	5
Other public	3,570	1,785	1,785	--
Forest industry	1,560	1,945	1,944	1
Farmer and miscellaneous private	1,085	700	697	3
All ownerships	2,124	12,836	12,827	9
	Board feet	- - - - - - - *Million board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	11,340	41,304	41,292	12
Other public	16,156	8,078	8,078	--
Forest industry	5,983	7,461	7,461	--
Farmer and miscellaneous private	3,518	2,269	2,269	--
All ownerships	9,780	59,112	59,100	12
Sawtimber (Scribner rule):				
National Forest	10,025	36,613	36,602	11
Other public	14,070	7,035	7,035	--
Forest industry	5,157	6,431	6,431	--
Farmer and miscellaneous private	2,947	1,901	1,901	--
All ownerships	8,600	51,980	51,969	11

Table 20.--*Net volume of growing stock and sawtimber on commercial timberland by county and ownership class, Central Oregon, January 1, 1973*

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
			Million cubic feet		
All growing stock:					
Crook	886	795	33	54	4
Deschutes	1,694	1,527	15	104	48
Jefferson	1,070	317	655	79	19
Klamath	4,791	3,107	274	983	427
Lake	2,223	1,635	2	583	3
Wasco	1,581	673	785	29	94
Wheeler[1/]	591	352	21	113	105
All counties	12,836	8,406	1,785	1,945	700
			Million board feet		
Sawtimber (International 1/4-inch rule):					
Crook	4,590	4,293	160	124	13
Deschutes	7,667	7,066	35	403	163
Jefferson	5,500	1,889	3,286	304	21
Klamath	20,268	13,970	1,162	3,655	1,481
Lake	10,656	8,126	9	2,513	8
Wasco	7,683	3,929	3,323	99	332
Wheeler[1/]	2,748	2,031	103	363	251
All counties	59,112	41,304	8,078	7,461	2,269
Sawtimber (Scribner rule):					
Crook	4,100	3,842	145	102	11
Deschutes	6,799	6,288	29	349	133
Jefferson	4,892	1,724	2,891	260	17
Klamath	17,652	12,229	1,015	3,142	1,266
Lake	9,402	7,189	8	2,198	7
Wasco	6,720	3,521	2,855	78	266
Wheeler[1/]	2,415	1,820	92	302	201
All counties	51,980	36,613	7,035	6,431	1,901

[1/] Includes Gilliam County.

Table 21.--*Net annual growth of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Central Oregon, 1972*

Ownership class	Growth per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Thousand cubic feet* - - - - - - -		
All growing stock:				
National Forest	31	111,900	111,900	--
Other public	64	32,200	32,200	--
Forest industry	36	45,400	45,400	(1/)
Farmer and miscellaneous private	36	23,400	23,400	--
All ownerships	35	212,900	212,900	(1/)
	Board feet	- - - - - - - *Thousand board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	142	518,000	518,000	--
Other public	260	130,000	130,000	--
Forest industry	123	154,000	154,000	--
Farmer and miscellaneous private	109	70,000	70,000	--
All ownerships	144	872,000	872,000	--
Sawtimber (Scribner rule):				
National Forest	125	457,000	457,000	--
Other public	226	113,000	113,000	--
Forest industry	106	132,000	132,000	--
Farmer and miscellaneous private	91	59,000	59,000	--
All ownerships	126	761,000	761,000	--

1/ Less than 50,000 cubic feet.

Table 22.--*Removals from growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Central Oregon, 1972*

Ownership class	Removals per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Thousand cubic feet* - - - - - - -		
All growing stock:				
National Forest	25	92,300	92,300	--
Other public	43	21,400	21,400	--
Forest industry	77	95,900	95,900	--
Farmer and miscellaneous private	13	8,500	8,500	--
All ownerships	36	218,100	218,100	--
	Board feet	- - - - - - - *Thousand board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	160	584,200	584,200	--
Other public	246	123,000	123,000	--
Forest industry	430	536,000	536,000	--
Farmer and miscellaneous private	68	44,000	44,000	--
All ownerships	213	1,287,200	1,287,200	--
Sawtimber (Scribner rule):				
National Forest	144	526,700	526,700	--
Other public	224	112,000	112,000	--
Forest industry	392	489,000	489,000	--
Farmer and miscellaneous private	60	39,000	39,000	--
All ownerships	193	1,166,700	1,166,700	--

Table 23.--*Net volume of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Blue Mountain Oregon, January 1, 1973*

Ownership class	Volume per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Million cubic feet* - - - - - -		
All growing stock:				
National Forest	2,588	8,645	8,642	3
Other public	1,738	146	145	1
Forest industry	1,484	564	564	--
Farmer and miscellaneous private	1,297	951	940	11
All ownerships	2,271	10,306	10,291	15
	Board feet	- - - - - - - *Million board feet* - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	11,557	38,612	38,602	10
Other public	7,321	615	613	2
Forest industry	5,200	1,976	1,976	--
Farmer and miscellaneous private	4,121	3,021	2,978	43
All ownerships	9,745	44,224	44,169	55
Sawtimber (Scribner rule):				
National Forest	9,939	33,207	33,199	8
Other public	6,262	526	524	2
Forest industry	4,324	1,643	1,643	--
Farmer and miscellaneous private	3,422	2,508	2,466	42
All ownerships	8,348	37,884	37,832	52

Table 24.--*Net volume of growing stock and sawtimber on commercial timberland by county and ownership class, Blue Mountain Oregon, January 1, 1973*

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
			Million cubic feet		
All growing stock:					
Baker	1,189	1,034	10	8	137
Grant	3,427	3,109	42	94	182
Harney	788	770	(1/)	4	14
Malheur	11	2	9	(2/)	--
Morrow	443	319	2	69	53
Umatilla	1,149	865	58	94	132
Union	1,691	1,328	10	127	226
Wallowa	1,608	1,218	15	168	207
All counties	10,306	8,645	146	564	951
			Million board feet		
Sawtimber (International 1/4-inch rule):					
Baker	5,324	4,777	79	34	434
Grant	14,705	13,670	150	294	591
Harney	4,242	4,162	(1/)	12	68
Malheur	50	10	39	1	--
Morrow	1,741	1,262	6	280	193
Umatilla	4,754	3,634	246	347	527
Union	6,326	5,264	34	379	649
Wallowa	7,082	5,833	61	629	559
All counties	44,224	38,612	615	1,976	3,021
Sawtimber (Scribner rule):					
Baker	4,580	4,118	67	28	367
Grant	12,707	11,840	130	251	486
Harney	3,701	3,628	(1/)	11	62
Malheur	41	8	32	1	--
Morrow	1,469	1,075	5	224	165
Umatilla	4,024	3,080	210	288	446
Union	5,329	4,459	29	310	531
Wallowa	6,033	4,999	53	530	451
All counties	37,884	33,207	526	1,643	2,508

1/ Combined with Malheur County.

2/ Less than 500,000 cubic feet.

Table 25.--*Net annual growth of growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Blue Mountain Oregon, 1972*

Ownership class	Growth per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Thousand cubic feet* - - - - - - -		
All growing stock:				
National Forest	38	125,400	125,400	--
Other public	32	2,700	2,700	--
Forest industry	19	7,300	7,300	--
Farmer and miscellaneous private	38	28,100	28,200	1/ -100
All ownerships	36	163,500	163,600	1/ -100
	Board feet	- - - - - - - *Thousand board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	154	515,000	515,000	--
Other public	143	12,000	12,000	--
Forest industry	92	35,000	35,000	--
Farmer and miscellaneous private	150	110,000	109,600	400
All ownerships	148	672,000	671,600	400
Sawtimber (Scribner rule):				
National Forest	130	434,000	434,000	--
Other public	119	10,000	10,000	--
Forest industry	79	30,000	30,000	--
Farmer and miscellaneous private	126	92,000	91,500	500
All ownerships	125	566,000	565,500	500

1/ Negative net growth is the result of mortality exceeding gross growth.

Table 26.--*Removals from growing stock and sawtimber on commercial timberland by ownership class and by softwoods and hardwoods, Blue Mountain Oregon, 1972*

Ownership class	Removals per acre	All species	Softwoods	Hardwoods
	Cubic feet	- - - - - - - *Thousand cubic feet* - - - - - - -		
All growing stock:				
National Forest	30	101,700	101,700	--
Other public	27	2,300	2,300	--
Forest industry	34	13,100	13,100	--
Farmer and miscellaneous private	20	14,400	14,400	--
All ownerships	29	131,500	131,500	--
	Board feet	- - - - - - - *Thousand board feet* - - - - - - -		
Sawtimber (International 1/4-inch rule):				
National Forest	200	669,300	669,300	--
Other public	155	13,000	13,000	--
Forest industry	195	74,000	74,000	--
Farmer and miscellaneous private	109	80,000	80,000	--
All ownerships	184	836,300	836,300	--
Sawtimber (Scribner rule):				
National Forest	181	605,000	605,000	--
Other public	143	12,000	12,000	--
Forest industry	176	67,000	67,000	--
Farmer and miscellaneous private	98	72,000	72,000	--
All ownerships	167	756,000	756,000	--

DEFINITIONS

Commercial Timberland

Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation.

Deferred Forest Land

National Forest lands that meet productivity standards for commercial timberland but are under study for possible inclusion in the Wilderness System.

Farmer and Miscellaneous Private Lands

Private lands other than those owned by forest industry.

Forest Industry Lands

Lands owned by companies or individuals operating wood-using plants.

Forest Land

Land at least 10 percent stocked by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use. (Also see "Commercial Timberland," "Productive-reserved Forest Land," and "Unproductive Forest Land.") Includes chaparral areas and afforested acres. The minimum area for classification as forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, and clearings in forest areas are classed as forest land if less than 120 feet wide.

Growing Stock Volume

Net volume in cubic feet of live sawtimber and poletimber trees from stump to a minimum 4-inch stem top (of central stem) outside bark or to the point where the central stem breaks into limbs.

Hardwoods

Dicotyledonous trees, usually broad leaved and deciduous.

Land Area

a. Bureau of the Census. Area of dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area.

b. Forest Survey. Same as the Bureau of the Census except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

National Forest Land

Federal lands which have been designated by Executive order or statute as National Forests and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Net Annual Growth

The annual change in volume of sound wood in live sawtimber and poletimber trees resulting from natural causes.

Net Volume in Board Feet

The gross board-foot volume of trees less deductions for rot or other defect affecting use of lumber.

Net Volume in Cubic Feet

Gross volume in cubic feet less deductions for rot.

Nonforest Land

Land that has never supported forests and lands formerly forested but now developed for nonforest uses such as crops, improved pasture, residential areas, city parks, improved roads and adjoining rights-of-way, powerline clearings, and certain areas of water classified by the Bureau of the Census as land (see definition for "Land Area"). In forest areas, unimproved roads, streams, canals, and nonforest strips must be more than 120 feet wide, and clearings in forest areas must be more than 1 acre in size, to qualify as nonforest land.

Other Public Lands

Federal lands other than National Forests, including lands administered by the Bureau of Land Management and Bureau of Indian Affairs, and miscellaneous Federal agencies, and lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Productive-reserved Forest Land

Productive public forest land withdrawn from timber utilization through statute or administrative regulation.

Removals

Volume of live sound timber removed from the growing stock inventory including timber products and logging residue.

Sawtimber Trees

Live trees of commercial species, at least 11.0 inches in diameter at breast height. Softwood trees must contain at least one 12-foot saw log with a top diameter of not less than 6 inches inside bark; hardwood trees must contain at least one 8-foot saw log with a top diameter of not less than 8 inches inside bark. At least 25 percent of the board-foot volume in a tree must be free of defect for either softwoods or hardwoods.

Sawtimber Volume

Net volume of the saw-log portion of live sawtimber trees in board feet.

Softwoods

Coniferous trees, usually evergreen, with needles or scalelike leaves.

Timber Removals

The net volume of growing stock trees removed from the inventory by harvesting, cultural operations (such as stand improvement), land clearing, or changes in land use.

Unproductive Forest Land

Forest land incapable of yielding crops of industrial wood because of adverse site conditions. Includes sterile or poorly drained forest land, subalpine forests, and steep rocky areas where topographic conditions are likely to prevent management for timber production.

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The mission of the PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION is to provide the knowledge, technology, and alternatives for present and future protection, management, and use of forest, range, and related environments.

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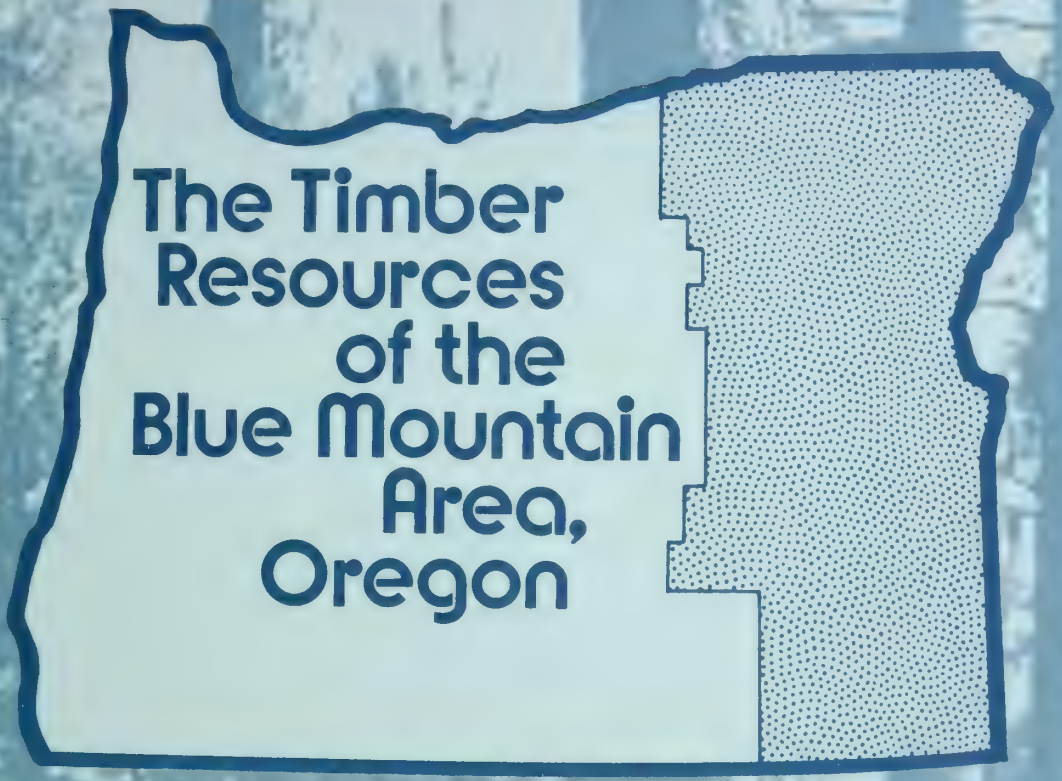

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PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
PORTLAND, OREGON

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The Division of Timber Management, Region 6, U.S. Forest Service, supplied forest resource data for National Forest lands. The county assessors furnished ownership information and aerial photo coverage of certain areas. The Agricultural Stabilization and Conservation Service furnished aerial photography. Many public agencies, including some of those mentioned above, and several private timber companies provided maps and helpful information on access to forest lands, as well as general information related to forest management activities in the Blue Mountain Area.

Preface

This report summarizes the findings of the third inventory of the forests in Baker, Grant, Harney, Malheur, Morrow, Umatilla, Union, and Wallowa Counties in eastern Oregon. Fieldwork on lands outside the National Forests was completed during the summer of 1969. The Wallowa-Whitman National Forest was inventoried in 1966 and 1967, the Malheur National Forest in 1967 and 1968, and the Umatilla National Forest in 1968 and 1969. Inventory of the Snow Mountain Ranger District of the Ochoco National Forest in Grant and Harney Counties was completed in 1967, and that of the Crooked River Working Circle in Grant County was completed in 1962.

Previous inventories of these eight counties were completed as follows:

County	First inventory	Second inventory
Baker	1936-37	1956
Grant	1935-36	1958
Harney	1935	1953
Malheur	1936-37	1956
Morrow	1936	1954
Umatilla	1936	1958
Union	1936	1958
Wallowa	1935-36	1957

This report was prepared by the Forest Survey, a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928 and subsequent amendments. The purposes of the Forest Survey are (1) to obtain comprehensive information on timber and other forest resources, including the extent and condition of forest lands, the amount and kind of timber growing on these lands, the rate of forest growth and depletion, the amount of timber cut, and probable future trends in timber requirements, and (2) to analyze and make available resource information needed to formulate forest policies and programs. Resurveys are made periodically to update basic information.

The Forest Survey is conducted throughout the 50 States by the U.S. Forest Service Experiment Stations. The Pacific Northwest Forest and Range Experiment Station at Portland, Oregon, is responsible for the States of Alaska, California, Hawaii, Oregon, and Washington.

Abstract

The latest inventory of the timber resources of the Blue Mountain Area of Oregon indicates that there are about 47 billion board feet of sawtimber on 4.6 million acres of commercial forest land. Public agencies administer about 76 percent of the area and hold 89 percent of the sawtimber volume; farmer and miscellaneous private ownerships account for 16 percent of the area but only 6 percent of the sawtimber volume; and forest industries 8 percent of the commercial forest area and 5 percent of the volume. Total volume of timber and area of commercial forest land have declined about 10 percent since the mid-1950's.

Ponderosa pine is the most abundant species, accounting for 44 percent of the sawtimber volume. Douglas-fir accounts for 20 percent of the volume, with true firs and larch occurring in significant amounts.

Most of the available timber volume is in public ownership. Private timberland is largely cut over, with resulting low inventory volumes. Although total timber cut has remained at about the same level, the harvest from public lands has increased from 56 percent in 1960 to 82 percent in 1972.

KEYWORDS: Forest Surveys (regional), statistics (forest), eastern Oregon.

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Forest Land

Only 19 Percent of the Blue Mountain Area Is Commercial Forest Land

Of the 24,399,000 acres of land in the eight counties of Baker, Grant, Harney, Malheur, Morrow, Umatilla, Union, and Wallowa 6,029,000 acres or 25 percent are forested. Of the total forest area, 4,565,000 acres or 76 percent is classified as commercial forest land, approximately 18 percent of the total in the State of Oregon. Unproductive forest land totals 1,344,000 acres. Productive forest land reserved by law from timber cutting is estimated to total 111,000 acres; another 9,000 acres of productive forest are being studied for possible wilderness classification.

Three-fourths of the Commercial Forest Land Is on National Forests

The four National Forests in the Blue Mountain Area—Malheur, Ochoco, Umatilla, and Wallowa-Whitman—contain 3,368,000 acres or about 74 percent of the total commercial forest land. The Malheur and Wallowa-Whitman National Forests lie completely within the eight-county inventory area; three-fourths of the Umatilla National Forest and one-third of the Ochoco National Forest lie within the area.

Located in the higher elevations where heavier annual precipitation promotes better tree growth, the National Forests contain 75 percent of the forest land capable of growing 85 or more cubic feet of wood per acre per year but only 41 percent of the forest land capable of growing 50 cubic feet.

Private Owners Hold 24 Percent of Commercial Forest Area

Commercial forest area in ranches, farms, and miscellaneous private holdings totals 733,000 acres. These are generally the poorer forest lands due to their location in the lower elevations where insufficient moisture limits tree growth. Only 11 percent of these lands are capable of growing 85 or more cubic feet of wood per acre per year, and 54 percent are incapable of growing 50 cubic feet.

Timber companies, numbering at least 10, own 380,000 acres. Three corporations own 70 percent of this area. About one-fourth of the 380,000 acres are capable of growing 85 or more cubic feet of wood per acre per year. Timber companies have the highest proportion of land capable of growing 120 or more cubic feet per acre per year.

Other Public Holding Totals Less Than 2 Percent

The Umatilla Indian Reservation,[1] Bureau of Land Management (BLM), State of Oregon, and counties own an estimated 84,000 acres of commercial forest land, of which only 11 percent is capable of growing 85 or more cubic feet of wood per acre per year. The BLM lands, which amount to about 65 percent of the total "other public" holdings, occur in scattered tracts mostly in the arid forest fringe. The Umatilla Indian Reservation

[1] Indian lands were included in the sample of "other public" lands, though strictly speaking they are private.

forest lands lie in one block on the west slope of the Blue Mountains near Pendleton.

Condition of the Forest Is Changing

Since the previous inventory, the forests of the Blue Mountain Area have been heavily logged. In the mid-1950's, the acreage in sawtimber trees 21.0-inch d.b.h. and larger was 2.5 million acres; the present inventory shows 1.4 million acres—a reduction of 44 percent. Small sawtimber stands decreased from 1.7 million acres to 1.5 million. On the other hand, poletimber stands increased by 96,000 acres, and seedling and sapling stands showed an increase from 102,000 to 583,000 acres.

The current inventory shows 121,000 acres of nonstocked commercial forest land, compared with 50,000 in the previous inventory. Since there were few major fires during the remeasurement period, and many formerly sparsely stocked areas are now classified as nonforest, it appears that the increase in nonstocked acreage is primarily the result of logging. About 57 percent of the nonstocked land is on National Forests, 2 percent on other public, and 41 percent on private lands. The nonstocked acreage amounts to about 2 percent of public lands and 4 percent of private lands.

Private and Other Public Lands Are in Poor Condition for Timber Production

Most of the private and public lands outside National Forests have been cut over or burned in the past few decades, so that only 5 percent of the area now supports old-growth sawtimber. These lands are in generally poor condition for efficient timber production. Only 189,000 acres, or 16 percent, is 70 percent or better stocked with desirable trees; and 601,000 acres, or 50 percent, is less than 40 percent stocked with desirable trees. Not only are there many poorly stocked cut over areas, but many trees that are restocking these lands, or have been left in cut over stands, are very poor trees for timber production. Common defects include

1. Mistletoe, gall rust, and other diseases.
2. Top- and bole-damaged trees—often damaged during logging operations.
3. Top kill by animals and weather.
4. Deformed, suppressed, and excessively limby trees. These trees make up a small part of all stands but tend to make up a large part of stands left after logging.
5. Unknown damaging agents causing discoloration and sparse foliage.
6. Rot in tree boles caused by *Fomes pini, Echinodontium tinctorium,* and other fungi.

Timber Volume

Blue Mountains Contain 10 Percent of the State's Sawtimber

Total volume of sawtimber on all commercial forest land in the Blue Mountain Area is estimated at 46,550 million board feet (International ¼-inch rule), roughly 10 percent of the total for the State of Oregon. Cubic-foot volume in trees 5.0-inch d.b.h. and larger totals 10,376 million cubic feet.

National Forests Have Most of the Sawtimber

The National Forests hold 40,817 million board feet or 88 percent of the standing sawtimber. Farmer and miscellaneous private owners hold 2,960 million or 6 percent, and forest industries hold 2,155 million or about 5 percent. Other public owners have 618 million or about 1 percent.

Ponderosa Pine Is the Most Abundant Species

Ponderosa pine is the most abundant species, accounting for 44 percent of the sawtimber volume. Douglas-fir accounts for 20 percent, true firs 19 percent, and larch 9 percent. The remaining volume consists of Engelmann spruce, lodgepole pine, and a relatively small volume of other species, including hardwoods.

Timber Volume Is Declining

The current inventory shows about 7.7 percent less cubic-foot volume and 10.1 percent less Scribner board-foot volume than the previous inventory. International ¼-inch board-foot comparisons were not made because of the different utilization standards for the two inventories. Comparisons for National Forests and all other ownerships follow:

	Previous inventory	Current inventory	Difference
	Growing stock volume (Million cubic feet)		(Percent)
National Forests	8,869	8,726	–1.6
All other ownerships	2,376	1,650	– 30.6
Total	11,245	10,376	–7.7
	Sawtimber volume (Million board feet, Scribner)		
National Forests	36,067	34,693	–3.8
All other ownerships	7,856	4,815	– 38.7
Total	43,923	39,508	– 10.1

Ponderosa Pine Is Declining Rapidly

The cubic-foot volume of ponderosa pine, the most important species in the Blue Mountains in terms of total standing volume and use by forest industries, has declined 21 percent. Cutting in this species has greatly exceeded the growth rate. Prospects for increased growth of ponderosa pine in the near future are poor, especially on private lands where cutting has removed a large percentage of the trees on which growth could be occurring; the remaining stands are often poorly stocked, made up of inferior trees left after logging, or consist of other species such as Douglas-fir or true firs.

Douglas-fir, True Firs, and Lodgepole Pine Are Increasing, Other Conifers Declining

Total cubic-foot volume of Douglas-fir white, grand, and subalpine firs, and lodge pole pine is 5 percent greater than shown i the previous inventory. In many stands th cutting of ponderosa pine has release Douglas-fir and true fir trees, acceleratin their growth. The true firs and lodgepole pin also occur in some of the remote areas not ye opened up to timber cutting.

Total cubic-foot volume of western larch Engelmann spruce, and whitebark and west ern white pines has declined by 14 percent principally due to low growth and hig mortality rates in these species.

Timber Cut and Growth

Blue Mountains Contribute About 7 Percent of Oregon Timber Harvest

In 1970, 657.8 billion board feet of timber were cut in the eight-county area, or 7.3 percent of the total cut in Oregon. The average annual timber cut in the Blue Mountains for the period 1960-70 was 777.1 million board feet. Grant County has consistently produced the greatest cut, averaging over one-third of the total in the Blue Mountains and exceeded only by Klamath and Lake Counties in all of eastern Oregon.

Forest Industries Are Becoming Dependent on National Forest Timber

Since the previous inventory (mid-950's), the total timber cut on all ownerships has remained about the same, but the cut on private lands has decreased from over 400 million to less than 200 million, and the cut on National Forest lands has increased from less than 300 million to over 500 million (fig. 1). In 1953, 63 percent of the timber harvest in the Blue Mountain Area came from private lands; in 1972, only 17 percent.

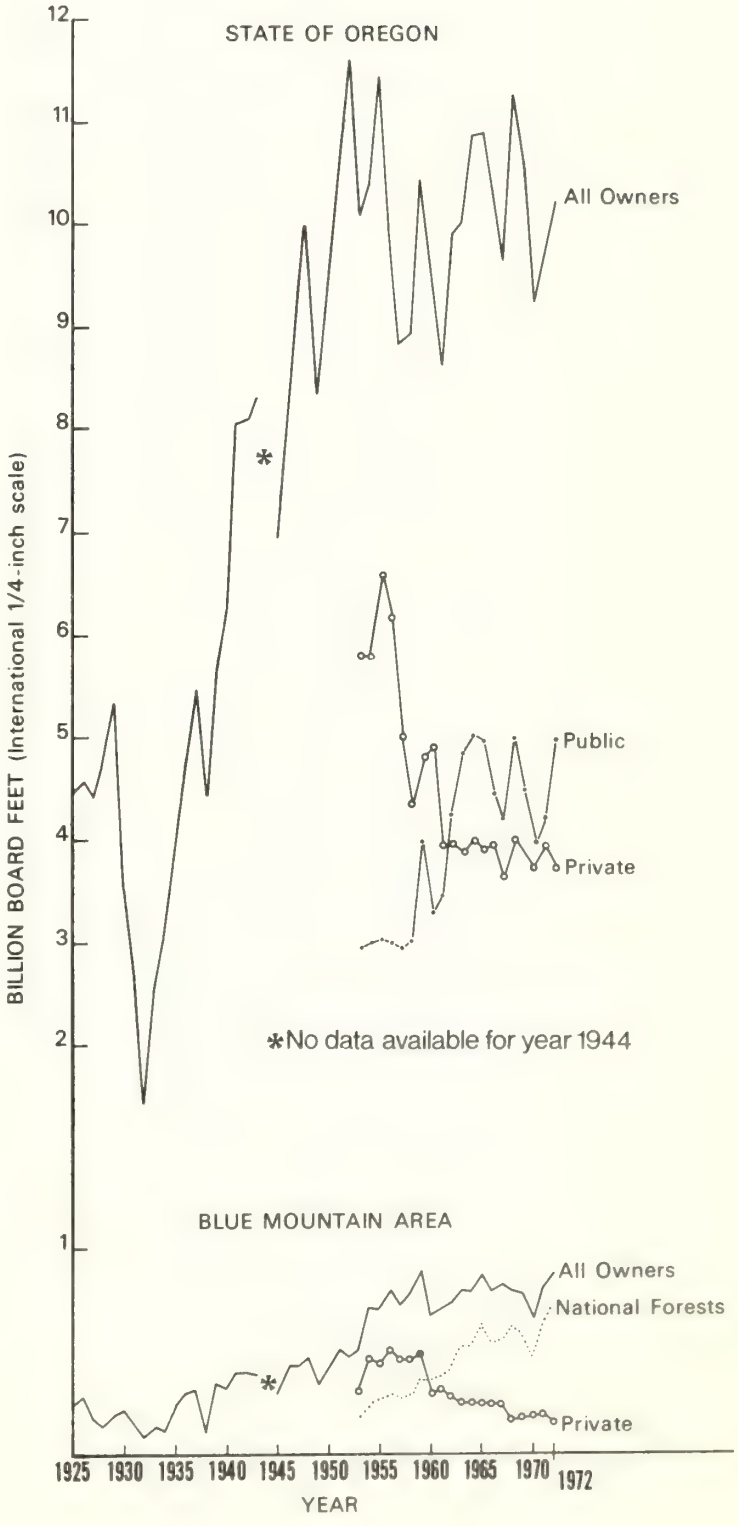

Figure 1.—Timber harvest in Oregon and in the Blue Mountains of Oregon, 1925-72.

Timber Growth Is Slightly Less Than Cut for All Ownerships

Net annual growth of sawtimber on all ownerships in 1969 was estimated to be 727.5 million board feet (International ¼-inch rule) or 1.56 percent of the inventory volume. Cubic-foot growth was 159.1 million, or 1.53 percent of the inventory volume. The average annual timber harvest for 1970-72–780.7 million board feet–was 7.3 percent more than growth.

Table 1 shows growth, cut, and annual change in inventory by broad ownership classes. The figures indicate that the National Forest and other public inventories are either almost static or decreasing slowly compared with the more rapid decrease on private lands.

Net board-foot growth per acre (International ¼-inch rule) by ownership is shown in the following tabulation:

National Forest	171
Other public	143
Forest industry	89
Farmer and miscellaneous private	143
Average, all owners	159

National Forests have the highest growth rates, yet 54 percent of these lands are stocked with old-growth timber. Forest industries, on the other hand, have the lowest growth rates, but only 8 percent of their holdings are in old growth, and their lands are slightly more productive. Current growth in young stands is less than normal yield tables indicate they should be, and growth in old stands is greater. This situation occurs primarily because of the present stocking condition and the manner in which the present stands seem to have developed.

Table 1.--*Net annual growth, cut, and change in inventory for National Forest, other public, and private lands in the Blue Mountain Area, 1970-72*

Owner	Net annual growth	Average annual cut[1/]	Growth as a percent of cut	Cut as a percent of 1970 inventory	Annual change as a percent of 1970 inventory
	- - - Million board feet - - - (International 1/4-inch rule)				
National Forest	576	594	97	1.5	-0.04
Other public	12	13	92	2.1	-.16
Private	139	174	80	3.4	-.68
Total	727	781	93	1.7	-.12

[1/] Average annual cut is that reported by the various agencies; it has not been adjusted to account for total depletion of the standing timber.

Many present old-growth stands appear to have developed from a sparse stocking condition over large areas, with widely scattered pockets of overly dense trees. The growth rate in these stands was relatively low when they were young; but as they grew older, the overall stocking improved in the open areas and possibly held steady in the clumps so that growth increased, rather than dropping sharply as shown in normal yield tables. Thus, many stands 150 years and older are still not so dense that growth has declined. Current young-growth stands in many cases are like the precursors of the present old-growth stands—poorly stocked with dense clumps scattered throughout. The low growth rates in young stands has also been promoted by logging practices—especially on private lands, where not only is stocking low, but the trees remaining are often damaged, diseased, and of poor vigor.

This is a point-in-time phenomenon. Though the immediate effect of logging the old growth will apparently be to reduce the growth, intensive management could result in better stocking conditions in young stands and increased growth rates.

Mortality

Mortality Is Nearly a Quarter Billion Board Feet Per Year

Average annual mortality[2] of sawtimber as measured during a 5-year period just preceding the Douglas-fir tussock moth epidemic is estimated to be 244.9 million board feet (International ¼-inch rule) or about 0.53 percent of the inventory volume. For all ownerships, weather, insects, and disease (in that order) were the leading known causes of mortality, accounting for 64 percent of the total board-foot loss. Most insect and disease mortality occurred on National Forests. While weather-caused mortality occurred on all lands, it was proportionately greatest on private lands, amounting to about one-fourth of the total mortality, and heaviest in cutover and young-growth stands. Logging damage caused about 2 percent of the board-foot mortality, but over 6 percent of the cubic-foot mortality, and was greatest on private lands because of heavier past cutting there. Losses from fire, animals, suppression, and miscellaneous agents such as landslides, erosion, fluctuating water tables, various activities by man including damage by vehicles (other than logging), fence building, camping, and others accounted for 6 percent of the mortality. About 28 percent of the mortality was due to undetermined causes.

[2] As developed from forest inventory plots. See procedures, page 56., for period of time over which mortality was measured.

Mortality Heaviest in True Firs

Mortality in white, grand, and subalpir firs amounted to 34 percent of the tot mortality, yet these species account for onl 19 percent of the total volume. Sever factors combined caused this high mortalit rate. (1) Large areas of true fir stands a "overstocked." Such stands include man trees that are under stress and are susceptib to insect (especially *Scolytis*) and disea attack, particularly during very dry year This kind of mortality is normal in th development of unmanaged true fir stand forest management minimizes such losse (2) Large areas of old-growth stands wit many weakened and defective trees, invi insect attack and make trees vulnerable t windthrow. (3) *Phellinus weirii (Poria weiri* occurs in true firs in the Blue Mountains. Th disease is now thought to be more serious the Blue Mountains than formerly believe Unlike *P. weirii* infections in the Casca Range, which tend to be small in size, these the Blue Mountains may sometimes encor pass several hundred acres.

In spite of the high mortality rate in tru firs, the volume of these species has bee increasing due to a high gross growth rate—3 percent of inventory volume compared wit 1.9 percent for all other species—and a rel tively low rate of cutting.

Western Larch Mortality Is High Due to Dwarf Mistletoe

Mortality cancels out over 50 percent

he gross growth of western larch. Dwarf nistletoe is the primary agent, either killing rees outright or making them susceptible to ther mortality agents.

Dwarf mistletoe in western larch has ncreased over the years to the point where it s difficult to find stands that are not in- ected. This disease has increased apparently ue to (1) fire control which has prevented he kind of fires that historically removed nistletoe from large areas, and (2) timber utting practices which open up stands allow- ig light to enter but do not remove all the nistletoe-infected trees. With increased light ie mistletoe spreads rapidly to other trees.

Since the inventory was completed, an- ther pest has attacked western larch in the lue Mountains—the larch casebearer. The xtent of damage is not known.

ngelmann Spruce Mortality Is High

The Engelmann spruce bark beetle has aused heavy mortality locally, resulting in a ercentage loss of spruce almost as great as rch. Since this species accounts for only 4 ercent of the total volume, the mortality is f little importance as far as timber produc- on is concerned; but because this species nerally grows along streambanks and high ountain lakes, the mortality may be a gnificant loss in terms of watershed and enic values.

nderosa Pine Mortality Is Low

Mortality in ponderosa pine accounted for out 24 percent of the total mortality, ough this species makes up 44 percent of e total volume. The actual mortality rate of is species may be somewhat higher than dicated by the inventory. Because of the tensive road system in the lower elevations here ponderosa pine stands predominate, a rge proportion of the trees are cut shortly er they die, or even as they begin to show ns of weakening. No attempt was made to termine the loss of ponderosa pine—or any her species—in stands where the mortality was salvaged before inventory remeasurements were made. This probably has more effect on ponderosa pine mortality estimates than for the more inaccessible species.

Mortality in Other Species Is Low

Mortality in other species, including Douglas-fir and lodgepole pine, was not particularly serious during the remeasurement period. Since the inventory, the tussock moth has attacked Douglas-fir; and the mountain pine beetle has invaded several thousand acres of lodgepole pine in the headwaters of the Grande Ronde and North Fork of the John Day Rivers.

Tussock Moth Epidemic

During the period 1971 through 1973, after the Blue Mountains' forest inventory had been completed, an outbreak of the Douglas-fir tussock moth killed an estimated 548.7 million board feet (Scribner) of timber.[3]

Ownership	Area affected	Volume killed	Salvable volume
	(Acres)	(Million fbm, Scribner)	
National Forest	297,390	411.8	250.8
Other public and private	141,060	136.9	116.3
Total	438,450	548.7	367.1

This is equivalent to 1.4 percent of the 1970 inventory and about seven-tenths of the average annual timber harvest in the Blue Mountain Area. About two-thirds of the mortality is considered salvable.

[3] Environmental Statement Cooperative Douglas-fir Tussock Moth Pest Management Plan, March 1974. Prepared by U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, P.O. Box 3623, Portland, Oregon 97208.

The volume, growth, and mortality figures shown elsewhere in this report have not been adjusted to account for the tussock moth epidemic.

Salvable Dead Volume Totals 655 Million Board Feet

Dead sawtimber trees with more than 25 percent sound wood are estimated to contain a total of 655.1 million board feet in the eight-county area. This does not include the salvable volume of trees killed in the tussock moth epidemic. True firs, which have the greatest mortality rate, contain only 11 pe cent of the salvable dead volume because tl wood of these species deteriorates rapid when dead. Western larch makes up one-thi of the salvable dead volume, and pondero pine and Douglas-fir, each roughly one-fourt

Only 15 percent of the salvable de volume is in concentrations of 2,500 or mo board feet per acre. Over two-fifths is concentrations of less than 1,000 board fe per acre. The amount of dead volume that currently accessible and economic to log unknown.

Timber Industry

In 1972 there were 30 forest industry mills in the Blue Mountain Area, including 23 lumber mills, 4 veneer and plywood plants, 2 pulp and board mills and 1 shake and shingle mill. Since the 1968 survey, there has been a loss of four lumber mills and one veneer and plywood mill. The shake and shingle mill is new.

The number of sawmills in the Blue Mountain Area has fluctuated over the years; but the trend since 1948, as throughout Oregon and Washington, is toward fewer and larger mills. The following tabulation shows the number of sawmills in the eight-county area for selected years during the period 1925 to 1972.

Year	Number of sawmills
1925	40
1940	46
1948	76
1968	27
1972	23

Total reported roundwood consumption in the Blue Mountain Area in 1972 was 741 million board feet, about 7 percent of the total in Oregon, and nearly identical to the total consumption in 1968. Over 75 percent of the consumption was by the lumber industry in both 1968 and 1972.

About 99 percent of the 1972 consumption in the Blue Mountain Area was from logs originating in the area. Roughly, 5 percent of the total timber harvest in the area was consumed outside the area, mostly in Crook and Wheeler Counties to the west.

Old-growth timber made up 75 percent of total timber consumption by all industries in 1972, a decrease of 4 percent since 1968.

Over the years there has been a change in the mix of species used by the industries (Wall 1972). Ponderosa pine was used almost exclusively in 1925 but now accounts for about 50 percent of the log consumption in the Blue Mountains. Douglas-fir, true firs, larch, and spruce, in that order, are now consumed by mills in the area. This has come about as the lower elevation pine forests have been logged, higher elevation forests of associated species opened up, and as market conditions have changed.

Changes in Forest Land Area

Commercial Forest Area Declining

The current inventory shows less commercial forest and more noncommercial forest than previous inventories conducted in the 1950's (1953-58):

	Previous inventory	Current inventory	Difference
		(Thousand acres)	
Commercial forest:			
National Forest	3,693	3,368	- 325
All other owners	1,519	1,197	- 322
Total	5,212	4,565	- 647
Unproductive unreserved:			
National Forest	221	298	+ 77
All other owners	522	909	+ 387
Total	743	1,207	+ 464
Productive reserved:			
National Forest[4]	106	106	0
All other owners	5	5	0
Total	111	111	0
Unproductive reserved:			
National Forest	136	136	0
All other owners	1	1	0
Total	137	137	0
Deferred:			
National Forest	0	9	+ 9
Total forest	6,203	6,029	-174

[4] The estimate of productive reserved area in National Forest ownership is based on an appraisal made during the previous inventories. It is believed that these estimates are high based on current definitions and procedures.

The difference in estimates of forest area between the previous and current inventories reflects (1) physical changes on the land, (2) ownership changes, (3) changes in definitions and procedures, and (4) administrative decisions.

Physical Changes in Forest Area

About 20,000 acres of National Forest commercial forest land were converted to nonforest by construction of roads, reservoirs, powerlines, pipelines, ski areas, campgrounds, and other developments since the mid-1950's. On all other ownerships, losses of commercial forest due to road construction were estimated to be about 5,000 acres.

Of the 387,000-acre increase in unproductive forest land outside National Forests since the previous inventory, an estimated 90,000 acres are due to the encroachment of juniper on nonforest rangelands. Juniper has invaded extensive areas of overgrazed rangeland, mostly on calcareous soils in Grant and northern Harney Counties.

Ownership Changes

About 6,000 acres, mostly commercial forest, were acquired by the National Forests, thus reducing the total of all other ownerships.

Changes in Definitions and Procedures

Of the total reduction of 325,000 acres of commercial forest land on National Forest lands, approximately 302,000 acres is due to change in definitions and procedures. About 7,000 acres formerly called commercial forest were reclassified as noncommercial forest because of more precise techniques for estimating forest productivity or because they are now considered physically impossible to manage or have been set aside in critical watershed areas.

Most of the remaining reduction of commercial forest land on National Forests is due to land being reclassified as nonforest. In the Blue Mountains, narrow fingerlike strips of timber bounded by nonforest grassland are common in the lower elevations and on south slopes in the higher elevations. The trees in these stringers are often growing in pockets of soil between the rocks or along fractures in the bedrock, frequently in very steep terrain. These stringers were classified as nonforest.

On all lands other than National Forests, the reduction in commercial forest area due to changes in definitions and procedure amounted to 311,000 acres. A new method of determining the stocking capacity of marginal forest land resulted in the reclassification of 237,000 acres that were formerly called commercial forest. These lands are now carried as noncommercial "low site," incapable of growing 20 cubic feet per acre per year. Most of these lands are in the lower forest fringe in the ponderosa pine–wheatgrass habitat type. They can be characterized as very open woodland–the pines short, limby, and slow-growing. Juniper and mountain-mahogany and several arid land shrubs are often present. The timber productivity of these areas is estimated to be only 20 percent of the yields shown in Walter Meyer's (1961) yield table for a given site index (MacLean and Bolsinger 1973). The volume of standing timber in such areas is very low. Though these marginal forest lands represent about 16 percent of the total land outside National Forests previously classified as commercial forest, they contain less than 7 percent of the total sawtimber volume outside National Forests. Much timber volume on these lands is poor in quality and scattered in occurrence.

The remaining 74,000-acre reduction in commercial forest land outside National Forest lands is due to their reclassification as nonforest.

Administrative Decisions

About 9,000 acres of productive forest land on the Wallowa-Whitman National Forest in the Minam River drainage have been classified as deferred, pending study for possible wilderness classification. These lands

may later be reclassified as commercial forest or may become productive reserved.

Change in Commercial Forest Ownership

In addition to the 6,000 acres acquired by National Forest, considerable shifting of ownership occurred among private landowners. In the four counties in which permanent plots on commercial forest land were remeasured (Grant, Umatilla, Union, and Wallowa), these changes were noted in ownership of the land on which the plots occurred:

Previous owner and approximate acres in the 1950's in four-county area	Current owner			
	Other public	Forest industry	Farmer	Miscellaneous private
	(Percent)			
Other public (80,000 acres)	91	9	0	0
Forest industry (200,000 acres)	0	97	3	0
Farmer (550,000 acres)	3	15	79	3
Miscellaneous private (96,000 acres)	0	61	23	16

The figures in the tabulation indicate that other public owners have acquired or sold very little commercial forest land and that forest industries have sold little, but acquired a lot, mostly from farmer and miscellaneous private owners. Many plots that remained in the same owner class changed owners during the remeasurement period. Included were transactions between timber companies as well as transfers of farms and miscellaneous private lands. In Grant County, for example, over 25 percent of the plots outside National Forests changed owners between 1958 and 1969.

TABLES

METRIC CONVERSIONS

1,000 acres	=	404.69 hectares
1,000 cubic feet	=	28.3 cubic meters
1 cubic foot per acre	=	0.0700 cubic meter per hectare
1 square foot basal area per acre	=	0.2296 square meter per hectare
1 foot	=	30.48 centimeters

Table 2.--*Area by land class and county, Blue Mountain Area, Oregon, January 1, 1970*

(In thousand acres)

Land class	All counties	Baker	Grant	Harney	Malheur	Morrow	Umatilla	Union	Wallowa
Forest land:									
Commercial	4,565	578	1,538	411	8	199	460	658	713
Deferred	9	--	--	--	--	--	--	4	5
Productive reserved	111	5	20	--	--	--	4	10	72
Unproductive	1,344	141	399	364	90	8	56	88	198
Total	6,029	724	1,957	775	98	207	520	760	988
Nonforest land[1/]	18,370	1,240	943	5,731	6,213	1,111	1,545	541	1,046
Total area[2/]	24,399	1,964	2,900	6,506	6,311	1,318	2,065	1,301	2,034

1/ Includes swampland, industrial and urban areas, other nonforest land, and 6,173 acres, classed as water by Forest Survey standards, but defined by the Bureau of the Census as land.

2/ Source: U.S. Bureau of the Census, Land and Water Area of the United States, 1960.

Table 3.--*Area of commercial forest land, by ownership class and county, Blue Mountain Area, Oregon, January 1, 1970*

(In thousand acres)

Ownership class	All counties	Baker	Grant	Harney	Malheur	Morrow	Umatilla	Union	Wallowa
National Forest	3,368	445	1,282	391	3	111	283	435	418
Other public:[1/]									
Bureau of Land Management	54	15	18	--	4	1	7	5	4
Bureau of Indian Affairs	16	--	--	--	--	--	15	1	--
Miscellaneous Federal	--	--	--	--	--	--	--	--	--
State	11	1	2	(2/)	--	--	3	--	5
County and municipal	3	1	--	--	--	--	2	--	--
Total other public	84	17	20	(2/)	4	1	27	6	9
Private:									
Forest industry	380	9	96	4	1	49	49	67	105
Farmer-owned	672	102	112	5	--	33	101	140	179
Miscellaneous private--corporate	16	--	--	11	--	5	--	--	--
Miscellaneous private--noncorporate	36	5	19	--	--	--	--	10	2
Miscellaneous private--leased to forest industry	9	--	9	--	--	--	--	--	--
Total private	1,113	116	236	20	1	87	150	217	286
All classes	4,565	578	1,538	411	8	199	460	658	713

[1/] Estimates of commercial forest land in specific ownerships are derived by sampling methods. Consequently, they may not agree with the official estimates of the individual agencies.

[2/] Less than 500 acres.

Table 4.--*Area of commercial forest land, by stand-size, age, and ownership classes, Blue Mountain Area, Oregon, January 1, 1970*

(In thousand acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Sawtimber stands:					
Old-growth [1/]	1,900	1,835	7	29	29
Young-growth [2/]	989	533	36	145	275
Total	2,889	2,368	43	174	304
Poletimber stands	972	640	13	102	217
Sapling and seedling stands	583	291	25	90	177
Nonstocked areas	121	69	3	14	35
All classes	4,565	3,368	84	380	733

[1/] Stands 140 years and older.

[2/] Stands less than 140 years old.

Table 5.--*Area of commercial forest land, by stand-size and ownership classes, Blue Mountain Area, Oregon, January 1, 1970*

(In thousand acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Sawtimber stands:					
21.0 inches and larger	1,407	1,321	15	43	28
11.0-20.9 inches	1,482	1,047	28	131	276
Total	2,889	2,368	43	174	304
Poletimber stands	972	640	13	102	217
Sapling and seedling stands	583	291	25	90	177
Nonstocked areas	121	69	3	14	35
All classes	4,565	3,368	84	380	733

Table 6.--*Area of commercial forest land, by stand volume and ownership classes, Blue Mountain Area, Oregon, January 1, 1970*

(In thousand acres)

Stand volume (board feet per acre[1/])	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Less than 1,500	571	237	22	63	249
1,500 to 4,999	984	540	18	146	280
5,000 to 9,999	1,126	854	21	105	146
10,000 to 19,999	1,257	1,138	17	55	47
20,000 to 29,999	481	453	6	11	11
30,000 to 39,999	121	121	--	--	--
40,000 to 49,999	22	22	--	--	--
50,000 or more	3	3	--	--	--
All classes	4,565	3,368	84	380	733

[1/] Net volume, International 1/4-inch rule.

Table 7.--*Area of commercial forest land, by cubic-foot site and ownership classes, Blue Mountain Area, Oregon, January 1, 1970*

(In thousand acres)

Site class[1/] (cubic feet per acre)	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
225 or more	2	2	--	--	--
165 to 224	1	1	--	--	--
120 to 164	117	27	--	55	35
85 to 119	613	523	8	34	48
50 to 84	2,895	2,428	51	165	251
20 to 49	937	387	25	126	399
All classes	4,565	3,368	84	380	733

[1/] A classification in terms of capacity for cubic-foot annual growth per acre at culmination of mean annual growth.

Table 8. --*Area of commercial forest land, by forest type and ownership classes, Blue Mountain Area, Oregon, January 1, 1970*

(In thousand acres)

Forest type	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Ponderosa pine	1,783	1,386	31	106	260
Lodgepole pine	525	450	1	17	57
Douglas-fir	846	464	27	94	261
White fir	660	531	16	63	50
Grand fir	290	209	--	34	47
Subalpine fir	133	118	3	12	--
Western larch	88	58	3	20	7
Engelmann spruce	81	61	--	20	--
Mountain hemlock	7	7	--	--	--
Commercial hardwoods[1/]	8	2	--	--	6
Noncommercial hardwood	23	13	--	--	10
Nonstocked	121	69	3	14	35
All types	4,565	3,368	84	380	733

[1/] Includes quaking aspen and black cottonwood forest types.

Table 9.--*Area of commercial forest land and volume of growing stock*

Stand age (years)	All ownerships			National Forest		
	Thousand acres	Growing stock	Sawtimber	Thousand acres	Growing stock	Sawtimber
		Million cubic feet	*Million board feet*[1/]		*Million cubic feet*	*Million board fee*
Nonstocked[2/]	121	26	143	69	15	8
0 - 9	108	76	307	28	13	6
10 - 19	62	34	99	14	11	4
20 - 29	54	54	152	32	25	9
30 - 39	155	148	550	77	87	33
40 - 49	128	155	394	77	107	36
50 - 59	243	394	1,091	120	204	63
60 - 69	392	666	2,118	195	395	1,29
70 - 79	218	554	1,801	150	411	1,25
80 - 89	95	286	881	77	241	68
90 - 99	51	161	546	44	142	50
100 - 109	35	123	494	35	123	49
110 - 119	42	117	426	33	86	24
120 - 129	13	44	199	13	44	19
130 - 139	26	51	222	15	34	14
140 - 149	27	99	558	27	99	55
150 - 159	19	75	366	19	75	36
160 - 169	7	18	106	7	18	10
170 - 179	7	26	148	7	26	14
180 - 189	4	11	66	4	11	6
190 - 199	12	43	255	12	43	25
200 - 299	149	450	2,840	140	438	2,76
300+	47	137	916	47	137	91
Uneven-aged under rotation age[2/]	1,617	3,492	15,104	1,249	2,985	13,32
Uneven-aged over rotation age[2/]	933	3,136	16,768	877	2,956	15,85
All classes	4,565	10,376	46,550	3,368	8,726	40,81

[1/] International 1/4-inch rule.

[2/] See "Definition of Terms."

[3/] Less than 500,000 cubic feet.

...mber, by stand-age and ownership classes, Blue Mountain Area, Oregon, January 1, 1970

Other public			Forest industry			Farmer and miscellaneous private		
...usand cres	Growing stock	Sawtimber	Thousand acres	Growing stock	Sawtimber	Thousand acres	Growing stock	Sawtimber
	Million cubic feet	*Million board feet*[1/]		*Million cubic feet*	*Million board feet*[1/]		*Million cubic feet*	*Million board feet*[1/]
3	(3/)	2	14	3	16	35	8	38
8	2	6	24	18	60	48	43	178
1	(3/)	1	13	9	41	34	14	9
-	--	--	11	18	50	11	11	8
5	11	39	21	12	38	51	38	135
0	2	--	8	15	16	33	31	14
3	22	49	38	58	143	72	110	264
5	12	41	24	38	136	167	221	645
9	20	90	27	58	213	32	65	246
4	18	92	2	8	29	12	19	74
-	--	--	4	12	21	3	7	24
-	--	--	--	--	--	--	--	--
-	--	--	--	--	--	9	31	178
-	--	--	--	--	--	--	--	--
-	--	--	4	9	39	7	8	39
-	--	---	--	--	--	--	--	--
-	--	--	--	--	--	--	--	--
-	--	--	--	--	--	--	--	--
-	--	--	--	--	--	--	--	--
-	--	--	--	--	--	--	--	--
-	--	--	--	--	--	--	--	--
-	--	--	--	--	--	9	12	71
-	--	--	--	--	--	--	--	--
8	36	170	161	242	912	190	229	694
7	22	128	29	90	441	20	68	343
8	145	618	380	590	2,155	733	915	2,960

Table 10.--Area of noncommercial forest land, by ownership class, land use and forest type, Blue Mountain Area, Oregon, January 1, 1970

(In thousand acres)

Land use and forest type	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
RESERVED					
Productive:[1]					
Ponderosa pine	23	19	4	--	--
Lodgepole pine	13	13	(2)	--	--
Douglas-fir	32	31	1	--	--
Western larch	16	16	--	--	--
White fir	6	6	(2)	--	--
Subalpine fir	15	15	--	--	--
Engelmann spruce	6	6	(2)	--	--
Hardwoods	(2)	--	(2)	--	--
Total	111	106	5	--	--
Unproductive:[3]					
Rocky[4]	70	70	(2)	--	--
Low site[5]	66	66	--	--	--
Noncommercial conifers	1	(2)	1	--	--
Total	137	136	1	--	--
Total reserved	248	242	6	--	--
UNRESERVED					
Unproductive:					
Low site					
Ponderosa pine	197	--	54	48	95
Lodgepole pine	2	2	--	--	--
Douglas-fir	40	--	12	12	16
Hardwoods	35	--	11	--	24
Unclassified	24	24	--	--	--
Total low site	298	26	77	60	135
Noncommercial rocky[4]	102	66	25	1	10
Adverse location[6]	79	79	--	--	--
Critical watershed[6]	31	31	--	--	--
Chaparral	10	--	7	--	3
Willow	10	1	--	--	9
Junipers	677	95	287	9	286
Total unreserved	1,207	298	396	70	443
Total noncommercial forest	1,455	540	402	70	443

[1] Includes forest land estimated in the previous inventory to be capable of growing 20 cubic feet or more per acre in the Anthony Lakes and Snake River Limited Areas, Eagle Cap and Strawberry Mountain Wildernesses, Canyon Creek Natural Area, and several State parks.

[2] Less than 500 acres.

[3] Forest types not determined.

[4] Includes areas that are capable of growing merchantable trees but are too steep or rocky for timber management. Forest types not determined.

[5] Areas stocked with commercial tree species but incapable of growing 20 cubic feet per acre because of soil and climatic factors. Forest types not determined.

[6] Includes unstable areas that cannot be logged without seriously affecting the watershed and small isolated patches of commercial forest land on steep mountainsides. Forest types not determined.

Table 11.--*Average number of growing-stock trees per acre on commercial forest land, by diameter and ownership classes, Blue Mountain Area, Oregon, January 1, 1970*

Diameter class (inches at breast height)	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
5.0 - 6.9	53.9	58.5	45.8	44.7	38.2
7.0 - 8.9	32.3	33.9	24.6	28.9	27.7
9.0 - 10.9	18.6	18.8	16.5	15.8	19.5
11.0 - 12.9	10.6	10.6	11.5	12.0	9.9
13.0 - 14.9	6.4	6.3	4.9	7.6	6.4
15.0 - 16.9	4.1	4.5	3.9	2.6	3.3
17.0 - 18.9	2.9	3.2	3.5	1.6	1.8
19.0 - 20.9	2.1	2.4	1.4	1.3	1.1
21.0 - 28.9	4.4	5.2	3.6	2.3	1.4
29.0 - 38.9	1.3	1.7	.8	.7	.2
39.0 and larger	.1	.2	.1	.1	.1
All classes	136.7	145.3	116.6	117.6	109.6

Table 12.--Number of growing-stock trees on commercial forest land, by species and diameter class, Blue Mountain Area, Oregon, January 1, 1970

(Thousand trees)

Species	Diameter class (inches at breast height)											
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0-38.9	39.0 and larger
Softwoods:												
Ponderosa pine	153,911	57,508	32,673	19,002	10,889	7,964	5,435	3,887	3,606	9,064	3,510	373
Lodgepole pine	152,284	77,601	43,558	19,674	7,720	2,303	915	294	116	101	2	--
Western white pine	169	--	75	33	9	9	5	4	4	22	8	--
Whitebark pine	128	42	--	76	--	--	--	--	10	--	--	--
Douglas-fir	111,533	34,443	26,074	17,586	10,599	6,993	4,621	3,337	2,179	4,512	1,070	119
White fir	76,572	30,280	16,899	10,093	6,579	4,193	2,508	1,795	1,266	2,263	610	86
Grand fir	38,628	14,597	8,499	5,213	3,120	2,300	1,527	1,015	780	1,184	344	49
Subalpine fir	27,846	11,052	7,028	4,210	2,529	1,206	761	473	240	326	20	1
Western larch	40,448	13,070	8,619	5,647	4,453	2,570	1,856	1,429	904	1,555	310	35
Engelmann spruce	19,485	6,177	3,418	2,998	2,123	1,442	1,178	778	452	753	157	9
Mountain hemlock	1,434	524	368	113	169	121	58	44	13	20	4	--
Total	622,438	245,294	147,211	84,645	48,190	29,101	18,864	13,056	9,570	19,800	6,035	672
Hardwoods[1/]	1,740	705	395	286	188	70	21	44	--	23	5	3
All species	624,178	245,999	147,606	84,931	48,378	29,171	18,885	13,100	9,570	19,823	6,040	675

[1/] Primarily quaking aspen, white alder, black cottonwood, and western paper birch.

Table 13.--*Volume of growing stock and sawtimber on commercial forest land, by ownership class and by softwoods and hardwoods, Blue Mountain Area, Oregon, January 1, 1970*

Ownership class	Average volume per acre	Total volume		
		All species	Softwoods	Hardwoods
	Cubic feet	*Million cubic feet*		
All growing stock:				
National Forest	2,591	8,726	8,723	3
Other public	1,726	145	144	1
Forest industry	1,553	590	590	--
Farmer and miscellaneous private	1,248	915	904	11
All ownerships	2,273	10,376	10,361	15
	Board feet	*Million board feet*		
Sawtimber (International 1/4-inch rule):				
National Forest	12,119	40,817	40,808	9
Other public	7,357	618	616	2
Forest industry	5,671	2,155	2,155	--
Farmer and miscellaneous private	4,038	2,960	2,918	42
All ownerships	10,197	46,550	46,497	53
Sawtimber (Scribner rule):				
National Forest	10,301	34,693	34,685	8
Other public	6,309	530	528	2
Forest industry	4,763	1,810	1,810	--
Farmer and miscellaneous private	3,376	2,475	2,434	41
All ownerships	8,655	39,508	39,457	51

Table 14.--Volume of growing stock and sawtimber on commercial forest land, by county and ownership class, Blue Mountain Area, Oregon, January 1,1970

County	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
			Million cubic feet		
Growing stock:					
Baker	1,217	1,048	19	8	142
Grant	3,476	3,159	41	106	170
Harney	801	784	(1/)	4	13
Malheur	10	2	8	(1/)	--
Morrow	434	306	2	75	51
Umatilla	1,112	842	50	92	128
Union	1,696	1,328	11	143	214
Wallowa	1,630	1,257	14	162	197
Total	10,376	8,726	145	590	915
			Million board feet		
Sawtimber (International 1/4-inch rule):					
Baker	5,673	5,102	78	35	458
Grant	15,721	14,652	159	349	561
Harney	4,562	4,484	--	16	62
Malheur	50	10	38	2	--
Morrow	1,774	1,261	7	316	190
Umatilla	4,809	3,698	234	356	521
Union	6,653	5,539	40	448	626
Wallowa	7,308	6,071	62	633	542
Total	46,550	40,817	618	2,155	2,960
Sawtimber (Scribner rule):					
Baker	4,822	4,337	66	29	390
Grant	13,456	12,553	138	301	464
Harney	3,960	3,889	--	15	56
Malheur	41	8	32	1	--
Morrow	1,485	1,061	6	255	163
Umatilla	4,034	3,091	199	299	445
Union	5,546	4,625	35	370	516
Wallowa	6,164	5,129	54	540	441
Total	39,508	34,693	530	1,810	2,475

1/ Less than 500,000 cubic feet.

Table 15.--*Volume of timber on commercial forest land, by class of timber and by softwoods and hardwoods, Blue Mountain Area, Oregon, January 1, 1970*

(In million cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Saw-log portion	7,356	7,348	8
Upper-stem portion	151	150	1
Total	7,507	7,498	9
Poletimber trees	2,869	2,863	6
All growing-stock trees	10,376	10,361	15
Sound cull trees	126	90	36
Rotten cull trees	355	354	1
Salvable dead sawtimber trees	135	135	--
Total, all timber	10,992	10,940	52

Table 16.--*Volume of growing stock and sawtimber on commercial forest land, by stand-size class and by softwoods and hardwoods, Blue Mountain Area, Oregon, January 1, 1970*

Stand-size class	Volume per acre	Total volume		
		All species	Softwoods	Hardwoods
	Cubic feet	*Million cubic feet*		
All growing stock:				
Sawtimber stands	2,746	7,753	7,740	13
Poletimber stands	2,039	1,917	1,917	(1/)
Sapling and seedling stands	966	538	537	1
Nonstocked areas	686	168	167	1
All classes	2,273	10,376	10,361	15
	Board feet	*Million board feet*		
Sawtimber (International 1/4-inch rule):				
Sawtimber stands	14,123	40,011	39,966	45
Poletimber stands	4,120	3,873	3,873	--
Sapling and seedling stands	3,451	1,922	1,919	3
Nonstocked areas	3,037	744	739	5
All classes	10,197	46,550	46,497	53
Sawtimber (Scribner rule):				
Sawtimber stands	12,086	34,119	34,076	43
Poletimber stands	3,340	3,140	3,140	--
Sapling and seedling stands	2,912	1,622	1,619	3
Nonstocked areas	2,559	627	622	5
All classes	8,655	39,508	39,457	51

1/ Less than 500,000 cubic feet.

Table 17.--*Volume of growing stock on commercial forest land, by species and county, Blue Mountain Area, Oregon, January 1, 1970*

(In million cubic feet)

Species	Total	Baker	Grant	Harney	Malheur	Morrow	Umatilla	Union	Wallowa
Softwoods:									
Ponderosa pine	3,544	447	1,368	713	1	133	197	284	401
Lodgepole pine	1,246	73	519	3	--	59	150	306	136
Western white pine	6	--	4	--	--	--	--	2	--
Whitebark pine	1	--	1	--	--	--	--	(1/)	--
Douglas-fir	1,996	235	541	41	8	110	282	313	466
White fir	1,230	249	559	41	1	10	41	180	149
Grand fir	714	2	96	--	--	70	231	172	143
Subalpine fir	330	56	58	--	--	2	25	85	104
Western larch	852	101	224	(1/)	(1/)	45	129	220	133
Engelmann spruce	423	53	105	--	--	5	56	117	87
Mountain hemlock	19	--	--	--	--	--	--	16	3
Total	10,361	1,216	3,475	798	10	434	1,111	1,695	1,622
Hardwoods[2/]	15	1	1	3	--	--	1	1	8
All species	10,376	1,217	3,476	801	10	434	1,112	1,696	1,630

1/ Less than 500,000 cubic feet.

2/ Consists primarily of black cottonwood and quaking aspen; also includes small amounts of red alder, white alder, and western paper birch.

Table 18.--*Volume of sawtimber on commercial forest land, by species and county, Blue Mountain Area, Oregon, January 1, 1970 (International 1/4-inch rule)*

(In million board feet)

Species	Total	Baker	Grant	Harney	Malheur	Morrow	Umatilla	Union	Wallowa
Softwoods:									
Ponderosa pine	20,533	2,386	8,146	4,249	7	791	1,160	1,409	2,385
Lodgepole pine	1,545	116	602	--	--	40	144	395	248
Western white pine	34	--	25	--	--	--	--	9	--
Whitebark pine	2	--	2	--	--	--	--	--	--
Douglas-fir	9,162	1,103	2,498	175	38	439	1,321	1,481	2,107
White fir	4,794	1,045	2,214	132	--	35	146	680	542
Grand fir	3,103	8	441	--	--	264	995	796	599
Subalpine fir	1,067	196	144	--	--	5	109	300	313
Western larch	4,194	554	1,153	1	5	188	652	948	693
Engelmann spruce	1,987	264	495	--	--	12	277	569	370
Mountain hemlock	76	--	--	--	--	--	--	66	10
Total	46,497	5,672	15,720	4,557	50	1,774	4,804	6,653	7,267
Hardwoods[1/]	53	1	1	5	--	--	5	--	41
All species	46,550	5,673	15,721	4,562	50	1,774	4,809	6,653	7,308

[1/] Consists primarily of black cottonwood and quaking aspen; also includes small amounts of white alder.

Table 19.--*Volume of sawtimber on commercial forest land by species and county, Blue Mountain Area, Oregon, January 1, 1970 (Scribner rule)*

(In million board feet)

Species	Total	Baker	Grant	Harney	Malheur	Morrow	Umatilla	Union	Wallowa
Softwoods:									
Ponderosa pine	17,868	2,062	7,114	3,694	6	692	1,017	1,201	2,082
Lodgepole pine	1,199	93	467	--	--	32	113	303	191
Western white pine	27	--	20	--	--	--	--	7	--
Whitebark pine	1	--	1	--	--	--	--	--	--
Douglas-fir	7,659	929	2,108	148	32	358	1,090	1,234	1,760
White fir	4,022	876	1,869	112	--	30	121	569	445
Grand fir	2,573	7	358	--	--	213	824	675	496
Subalpine fir	888	167	117	--	--	4	92	251	257
Western larch	3,451	460	979	2	3	146	532	759	570
Engelmann spruce	1,706	227	422	--	--	10	240	492	315
Mountain hemlock	63	--	--	--	--	--	--	55	8
Total	39,457	4,821	13,455	3,956	41	1,485	4,029	5,546	6,124
Hardwoods[1/]	51	1	1	4	--	--	5	--	40
All species	39,508	4,822	13,456	3,960	41	1,485	4,034	5,546	6,164

[1/] Consists primarily of black cottonwood and quaking aspen; also includes small amounts of white alder.

Table 20.--*Volume of growing stock on commercial forest land, by species and ownership class, Blue Mountain Area, Oregon, January 1, 1970*

(In million cubic feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Ponderosa pine	3,544	2,981	53	148	362
Lodgepole pine	1,246	1,139	3	31	73
Western white pine	6	6	--	--	--
Whitebark pine	1	(1/)	--	1	--
Douglas-fir	1,996	1,496	61	160	279
White fir	1,230	1,053	10	102	65
Grand fir	714	591	3	64	56
Subalpine fir	330	317	1	8	4
Western larch	852	719	12	65	56
Engelmann spruce	423	402	1	11	9
Mountain hemlock	19	19	--	--	--
Total	10,361	8,723	144	590	904
Hardwoods[2/]	15	3	1	--	11
All species	10,376	8,726	145	590	915

1/ Less than 500,000 cubic feet.

2/ Consists primarily of black cottonwood and quaking aspen; also includes small of white alder and western paper birch.

Table 21.--*Volume of sawtimber on commercial forest land, by species and ownership class, Blue Mountain Area, Oregon, January 1, 1970 (International 1/4-inch rule)*

(In million board feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Ponderosa pine	20,533	18,357	253	655	1,268
Lodgepole pine	1,545	1,402	9	12	122
Western white pine	34	34	--	--	--
Whitebark pine	2	--	--	2	--
Douglas-fir	9,162	7,362	256	648	896
White fir	4,794	4,175	34	341	244
Grand fir	3,103	2,662	9	228	204
Subalpine fir	1,067	1,034	--	33	--
Western larch	4,194	3,809	52	186	147
Engelmann spruce	1,987	1,897	3	50	37
Mountain hemlock	76	76	--	--	--
Total	46,497	40,808	616	2,155	2,918
Hardwoods[1/]	53	9	2	--	42
All species	46,550	40,817	618	2,155	2,960

[1/] Consists primarily of black cottonwood and quaking aspen; also includes small amounts of white alder.

Table 22.--*Volume of sawtimber on commercial forest land, by species and ownership class, Blue Mountain Area, Oregon, January 1, 1970 (Scribner rule)*

(In million board feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Ponderosa pine	17,868	16,001	222	573	1,072
Lodgepole pine	1,199	1,089	7	9	94
Western white pine	27	27	--	--	--
Whitebark pine	1	--	--	1	--
Douglas-fir	7,659	6,161	217	539	742
White fir	4,022	3,494	29	288	211
Grand fir	2,573	2,199	8	193	173
Subalpine fir	888	859	--	29	--
Western larch	3,451	3,161	42	137	111
Engelmann spruce	1,706	1,631	3	41	31
Mountain hemlock	63	63	--	--	--
Total	39,457	34,685	528	1,810	2,434
Hardwoods[1/]	51	8	2	--	41
All species	39,508	34,693	530	1,810	2,475

[1/] Consists primarily of black cottonwood and quaking aspen; also includes small amounts of white alder.

Table 23.--*Volume of growing stock on commercial forest land, by species and diameter class, Blue Mountain Area, Oregon, January 1, 1970*

(In million cubic feet)

Species	Diameter class (inches at breast height)											
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0-38.9	39.0 and larger
Softwoods:												
Ponderosa pine	3,544	180	174	178	173	193	192	196	238	1,062	806	152
Lodgepole pine	1,246	322	356	271	163	66	36	15	8	9	(1/)	--
Western white pine	6	--	(1/)	(1/)	(1/)	1	(1/)	(1/)	(1/)	3	2	--
Whitebark pine	1	(1/)	--	1	--	--	--	--	(1/)	--	--	--
Douglas-fir	1,996	118	161	191	184	181	169	163	138	443	204	44
White fir	1,230	100	108	117	123	119	98	93	85	237	123	27
Grand fir	714	52	59	65	66	69	64	58	56	135	71	19
Subalpine fir	330	37	49	51	50	35	31	25	16	31	4	1
Western larch	852	51	66	75	92	81	81	82	67	175	68	14
Engelmann spruce	423	22	25	38	44	44	50	45	34	85	33	3
Mountain hemlock	19	1	2	2	3	3	2	2	1	2	1	--
Total	10,361	883	1,000	989	898	792	723	679	643	2,182	1,312	260
Hardwoods[2/]	15	1	2	2	3	1	1	2	--	2	1	(1/)
All species	10,376	884	1,002	991	901	793	724	681	643	2,184	1,313	260

1/ Less than 500,000 cubic feet.

2/ Consists primarily of black cottonwood and quaking aspen; also includes small amounts of white alder and western paper birch.

Table 24.--*Volume of sawtimber on commercial forest land, by species and diameter class, Blue Mountain Area, Oregon, January 1, 1970 (International 1/4-inch rule)*

(In million board feet)

Species	Diameter class (inches at breast height)								
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0-38.9	39.0 and larger
Softwoods:									
Ponderosa pine	20,533	805	1,010	1,067	1,161	1,503	7,460	6,264	1,263
Lodgepole pine	1,545	821	354	198	82	41	47	2	--
Western white pine	34	1	1	1	2	2	17	10	--
Whitebark pine	2	--	--	--	--	2	--	--	--
Douglas-fir	9,162	920	964	951	959	838	2,822	1,395	313
White fir	4,794	557	569	486	485	455	1,340	724	178
Grand fir	3,103	356	399	380	337	330	795	403	103
Subalpine fir	1,067	244	188	172	144	93	195	27	4
Western larch	4,194	533	483	498	519	425	1,158	478	100
Engelmann spruce	1,987	224	233	271	259	198	549	230	23
Mountain hemlock	76	14	18	13	12	4	12	3	--
Total	46,497	4,475	4,219	4,037	3,960	3,891	14,395	9,536	1,984
Hardwoods[1/]	53	12	7	4	11	--	11	5	3
All species	46,550	4,487	4,226	4,041	3,971	3,891	14,406	9,541	1,987

[1/] Consists primarily of black cottonwood and quaking aspen; also includes small amounts of white alder.

Table 25.--*Volume of sawtimber on commercial forest land, by species and diameter class, Blue Mountain Area, Oregon, January 1, 1970 (Scribner rule)*

(In million board feet)

Species	Diameter class (inches at breast height)								
	All classes	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0-38.9	39.0 and larger
Softwoods:									
Ponderosa pine	17,868	598	793	870	971	1,273	6,547	5,651	1,165
Lodgepole pine	1,199	585	286	169	74	38	45	2	--
Western white pine	27	1	1	1	1	1	13	9	--
Whitebark pine	1	--	--	--	--	1	--	--	--
Douglas-fir	7,659	625	743	780	806	718	2,472	1,236	279
White fir	4,022	393	443	403	409	394	1,177	656	147
Grand fir	2,573	254	310	308	281	279	690	358	93
Subalpine fir	888	178	151	147	127	83	174	25	3
Western larch	3,451	333	369	414	448	372	1,018	413	84
Engelmann spruce	1,706	151	186	235	232	180	497	206	19
Mountain hemlock	63	10	14	11	10	4	11	3	--
Total	39,457	3,128	3,296	3,338	3,359	3,343	12,644	8,559	1,790
Hardwoods[1/]	51	10	7	4	11	--	11	5	3
All species	39,508	3,138	3,303	3,342	3,370	3,343	12,655	8,564	1,793

[1/] Consists primarily of black cottonwood and quaking aspen; also includes small amounts of white alder.

Table 26.--*Net annual growth of growing stock on commercial forest land, by species and ownership class, Blue Mountain Area, Oregon, January 1, 1970*

(In thousand cubic feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Ponderosa pine	41,600	28,900	700	2,700	9,300
Lodgepole pine	29,300	26,700	200	[1/] -300	2,700
Western white pine	100	100	—	--	--
Whitebark pine	(2/)	—	--	(2/)	--
Douglas-fir	34,800	21,500	1,000	3,700	8,600
White fir	25,600	22,000	400	1,200	2,000
Grand fir	10,500	9,700	300	[1/] -1,300	1,800
Subalpine fir	5,300	5,000	200	100	(2/)
Western larch	5,900	3,000	[1/] -300	900	2,300
Engelmann spruce	5,700	5,400	(2/)	100	200
Mountain hemlock	400	400	--	--	--
Total	159,200	122,700	2,500	7,100	26,900
Hardwoods[3/]	[1/] -100	(2/)	(2/)	--	[1/] -100
All species	159,100	122,700	2,500	7,100	26,800

[1/] Negative growth is the result of annual mortality exceeding gross annual growth.

[2/] Less than 50,000 cubic feet.

[3/] Consists primarily of black cottonwood and quaking aspen; also includes small amounts of white alder and western paper birch.

Table 27.--*Net annual growth of sawtimber on commercial forest land, by species and ownership class, Blue Mountain Area, Oregon, January 1, 1970 (International 1/4-inch rule)*

(In thousand board feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Ponderosa pine	217,500	157,300	3,900	10,700	45,600
Lodgepole pine	74,300	68,800	800	300	4,400
Western white pine	400	400	--	--	--
Whitebark pine	(1/)	--	--	(1/)	--
Douglas-fir	179,600	116,200	6,400	19,200	37,800
White fir	108,500	99,700	400	3,000	5,400
Grand fir	45,300	46,600	200	2/ -3,000	1,500
Subalpine fir	28,500	28,000	--	500	--
Western larch	32,300	20,200	200	2,900	9,000
Engelmann spruce	37,500	36,100	100	400	900
Mountain hemlock	3,100	3,100	--	--	--
Total	727,000	576,400	12,000	34,000	104,600
Hardwoods 3/	500	100	(1/)	--	400
All species	727,500	576,500	12,000	34,000	105,000

1/ Less than 50,000 board feet.

2/ Negative growth is the result of annual mortality exceeding gross annual growth.

3/ Consists of black cottonwood and quaking aspen; also includes small amounts of white alder.

Table 28.--*Net annual growth of sawtimber on commercial forest land, by species and ownership class, Blue Mountain Area, Oregon, January 1, 1970 (Scribner rule)*

(In thousand board feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Ponderosa pine	184,000	132,400	3,400	9,500	38,700
Lodgepole pine	54,800	50,000	600	400	3,800
Western white pine	400	400	--	--	--
Whitebark pine	(1/)	--	--	(1/)	--
Douglas-fir	143,900	91,400	5,000	16,400	31,100
White fir	89,100	80,500	400	3,400	4,800
Grand fir	33,300	35,800	200	2/ -4,500	1,800
Subalpine fir	22,500	22,000	--	500	--
Western larch	24,200	14,600	300	2,800	6,500
Engelmann spruce	30,100	28,600	100	500	900
Mountain hemlock	2,300	2,300	--	--	--
Total	584,600	458,000	10,000	29,000	87,600
Hardwoods 3/	500	100	(1/)	--	400
All species	585,100	458,100	10,000	29,000	88,000

1/ Less than 50,000 board feet.

2/ Negative growth is the result of annual mortality exceeding gross annual growth.

3/ Consists primarily of black cottonwood and quaking aspen; also includes small amounts of white alder.

Table 29.--*Net annual growth of growing stock on commercial forest land, by species and county, Blue Mountain Area, Oregon, January 1, 1970*

(In thousand cubic feet)

Species	All counties	Baker	Grant	Harney	Malheur	Morrow	Umatilla	Union	Wallowa
Softwoods:									
Ponderosa pine	41,600	7,600	13,100	7,800	(1/)	1,300	1,700	4,400	5,700
Lodgepole pine	29,300	3,400	12,100	(1/)	--	1,500	2,400	7,000	2,900
Western white pine	100	--	100	--	--	--	--	(1/)	--
Whitebark pine	(1/)	--	(1/)	--	--	--	--	--	--
Douglas-fir	34,800	1,400	9,400	500	200	2,100	4,100	6,800	10,300
White fir	25,600	5,700	11,400	900	(1/)	200	400	4,100	2,900
Grand fir	10,500	(1/)	1,800	--	--	1,100	4,000	1,600	2,000
Subalpine fir	5,300	200	1,200	--	--	(1/)	100	1,700	2,100
Western larch	5,900	(1/)	600	(1/)	(1/)	700	200	3,100	1,300
Engelmann spruce	5,700	600	1,200	--	--	100	700	1,500	1,600
Mountain hemlock	400	--	--	--	--	--	--	200	200
Total	159,200	18,900	50,900	9,200	200	7,000	13,600	30,400	29,000
Hardwoods 2/	3/-100	(1/)	(1/)	(1/)	--	--	(1/)	(1/)	3/-100
All species	159,100	18,900	50,900	9,200	200	7,000	13,600	30,400	28,900

1/ Less than 50,000 cubic feet.

2/ Consists primarily of black cottonwood and quaking aspen; also includes small amounts of white alder and western paper birch.

3/ Negative growth is the result of annual mortality exceeding gross annual growth.

Table 30.--*Net annual growth of sawtimber on commercial forest land, by species and county, Blue Mountain Area, Oregon, January 1, 1970 (International 1/4-inch rule)*

(In thousand board feet)

Species	All counties	Baker	Grant	Harney	Malheur	Morrow	Umatilla	Union	Wallowa
Softwoods:									
Ponderosa pine	217,500	28,600	62,200	39,700	100	9,600	11,100	24,500	41,700
Lodgepole pine	74,300	1,100	35,700	--	--	1,500	9,600	20,900	5,500
Western white pine	400	--	200	--	--	--	--	200	--
Whitebark pine	(1/)	--	(1/)	--	--	--	--	--	--
Douglas-fir	179,600	5,400	40,000	4,300	1,700	13,000	32,300	33,400	49,500
White fir	108,500	24,900	52,600	3,500	--	1,800	2,900	15,600	7,200
Grand fir	45,300	100	7,700	--	--	6,900	16,500	7,400	6,700
Subalpine fir	28,500	2,200	3,300	--	--	(1/)	3,200	6,500	13,300
Western larch	32,300	1,300	2,700	(1/)	(1/)	5,200	3,800	12,900	6,400
Engelmann spruce	37,500	5,600	7,400	--	--	100	3,300	13,600	7,500
Mountain hemlock	3,100	--	--	--	--	--	--	2,900	200
Total	727,000	69,200	211,800	47,500	1,800	38,100	82,700	137,900	138,000
Hardwoods[2/]	500	(1/)	(1/)	(1/)	--	--	(1/)	--	500
All species	727,500	69,200	211,800	47,500	1,800	38,100	82,700	137,900	138,500

1/ Less than 50,000 board feet.

2/ Consists primarily of black cottonwood and quaking aspen; also includes small amounts of white alder.

Table 31.--*Net annual growth of sawtimber on commercial forest land, by species and county, Blue Mountain Area, Oregon, January 1, 1970 (Scribner rule)*

Species	All counties	Baker	Grant	Harney	Malheur	Morrow	Umatilla	Union	Wallowa
Softwoods:									
Ponderosa pine	184,000	24,900	52,000	34,200	(1/)	8,000	9,200	21,300	34,400
Lodgepole pine	54,800	800	26,000	--	--	1,200	7,100	14,900	4,800
Western white pine	400	--	200	--	--	--	--	200	--
Whitebark pine	(1/)	--	(1/)	--	--	--	--	--	--
Douglas-fir	143,900	5,100	32,200	2,900	1,400	9,300	25,500	26,800	40,700
White fir	89,100	20,400	42,800	3,000	--	1,500	2,800	13,100	5,500
Grand fir	33,300	100	6,000	--	--	5,100	13,400	4,600	4,100
Subalpine fir	22,500	2,200	2,800	--	--	(1/)	2,400	5,100	10,000
Western larch	24,200	800	2,500	(1/)	100	4,100	2,700	9,000	5,000
Engelmann spruce	30,100	4,000	6,600	--	--	100	3,000	9,700	6,700
Mountain hemlock	2,300	--	--	--	--	--	--	2,200	100
Total	584,600	58,300	171,100	40,100	1,500	29,300	66,100	106,900	111,300
Hardwoods 2/	500	(1/)	(1/)	(1/)	--	--	(1/)	--	500
All species	585,100	58,300	171,100	40,100	1,500	29,300	66,100	106,900	111,800

1/ Less than 50,000 board feet.

2/ Consists primarily of black cottonwood and quaking aspen; also includes small amounts of white alder.

Table 32.--*Average annual mortality of growing stock on commercial forest land, by species and ownership class, Blue Mountain Area, Oregon, January 1, 1970*

(In thousand cubic feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Ponderosa pine	11,800	8,300	400	1,400	1,700
Lodgepole pine	9,700	7,800	(1/)	1,200	700
Douglas-fir	11,200	8,300	900	900	1,100
White fir	6,900	3,900	--	2,400	600
Grand fir	9,400	4,900	--	3,400	1,100
Subalpine fir	2,400	2,300	--	(1/)	100
Western larch	6,800	5,500	500	600	200
Engelmann spruce	2,600	2,600	--	--	--
Mountain hemlock	(1/)	(1/)	--	--	--
Total	60,800	43,600	1,800	9,900	5,500
Hardwoods[2/]	200	(1/)	--	--	200
All species	61,000	43,600	1,800	9,900	5,700

1/ Less than 50,000 cubic feet.

2/ Consists primarily of black cottonwood and red alder; also includes a small amount of quaking aspen.

Table 33.--*Average annual mortality of sawtimber on commercial forest land, by species and ownership class, Blue Mountain Area, Oregon, January 1, 1970 (International 1/4-inch rule)*

(In thousand board feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Ponderosa pine	58,700	45,400	2,400	6,200	4,700
Lodgepole pine	6,400	6,300	100	--	--
Douglas-fir	50,700	41,000	4,700	3,000	2,000
White fir	26,400	14,400	--	7,000	5,000
Grand fir	50,800	27,800	--	17,400	5,600
Subalpine fir	6,700	6,700	--	--	--
Western larch	31,200	27,300	800	2,400	700
Engelmann spruce	13,700	13,700	--	--	--
Mountain hemlock	200	200	--	--	--
Total	244,800	182,800	8,000	36,000	18,000
Hardwoods[1/]	100	100	--	--	--
All species	244,900	182,900	8,000	36,000	18,000

1/ Consists of quaking aspen.

Table 34.--*Average annual mortality of sawtimber on commercial forest land, by species and ownership class, Blue Mountain Area, Oregon, January 1, 1970 (Scribner rule)*

(In thousand board feet)

Species	All ownerships	National Forest	Other public	Forest industry	Farmer and miscellaneous private
Softwoods:					
Ponderosa pine	53,200	41,900	2,200	5,300	3,800
Lodgepole pine	5,300	5,200	100	--	--
Douglas-fir	45,000	36,700	4,100	2,600	1,600
White fir	23,400	13,200	--	5,800	4,400
Grand fir	44,100	24,900	--	14,600	4,600
Subalpine fir	5,700	5,700	--	--	--
Western larch	26,200	23,300	600	1,700	600
Engelmann spruce	11,900	11,900	--	--	--
Mountain hemlock	200	200	--	--	--
Total	215,000	163,000	7,000	30,000	15,000
Hardwoods[1/]	100	100	--	--	--
All species	215,100	163,100	7,000	30,000	15,000

[1/] Consists of quaking aspen.

Table 35.--*Average annual mortality of growing stock on commercial forest land by species and county, Blue Mountain Area, Oregon, January 1, 1970*

(In thousand cubic feet)

Species	All counties	Baker	Grant	Harney	Malheur	Morrow	Umatilla	Union	Wallowa
Softwoods:									
Ponderosa pine	11,800	1,900	5,100	1,200	--	500	1,200	1,000	900
Lodgepole pine	9,700	800	4,500	200	--	600	1,700	1,700	200
Douglas-fir	11,200	3,600	2,700	200	--	800	2,200	1,100	600
White fir	6,900	1,000	2,500	100	--	100	600	800	1,800
Grand fir	9,400	--	800	--	--	600	1,700	2,700	3,600
Subalpine fir	2,400	900	400	--	--	(1/)	200	500	400
Western larch	6,800	1,200	1,900	--	--	300	1,200	1,700	500
Engelmann spruce	2,600	600	600	--	--	(1/)	400	800	200
Western hemlock	(1/)	--	--	--	--	--	--	(1/)	--
Total	60,800	10,000	18,500	1,700	--	2,900	9,200	10,300	8,200
Hardwoods[2/]	200	--	(1/)	(1/)	--	--	--	--	200
All species	61,000	10,000	18,500	1,700	--	2,900	9,200	10,300	8,400

1/ Less than 50,000 cubic feet.

2/ Consists primarily of black cottonwood; also includes small amounts of quaking aspen.

Table 36.--*Average annual mortality of sawtimber on commercial forest land by species and county, Blue Mountain Area, Oregon, January 1, 1970 (International 1/4-inch rule)*

(In thousand board feet)

Species	All counties	Baker	Grant	Harney	Malheur	Morrow	Umatilla	Union	Wallowa
Softwoods:									
Ponderosa pine	58,700	6,200	27,900	6,900	--	3,300	7,100	4,000	3,300
Lodgepole pine	6,400	1,400	2,700	--	--	200	700	1,000	400
Douglas-fir	50,700	17,200	12,500	900	--	3,900	9,800	5,000	1,400
White fir	26,400	3,200	9,400	400	--	900	--	2,800	9,700
Grand fir	50,800	--	4,600	--	--	2,700	9,200	16,200	18,100
Subalpine fir	6,700	1,200	1,100	--	--	100	1,000	1,600	1,700
Western larch	31,200	5,700	8,100	--	--	1,300	6,100	8,000	2,000
Engelmann spruce	13,700	2,400	3,200	--	--	100	2,200	4,600	1,200
Mountain hemlock	200	--	--	--	--	--	--	200	--
Total	244,800	37,300	69,500	8,200	--	12,500	36,100	43,400	37,800
Hardwoods[1/]	100	--	100	--	--	--	--	--	--
All species	244,900	37,300	69,600	8,200	--	12,500	36,100	43,400	37,800

[1/] Consists of quaking aspen.

Table 37.--*Average annual mortality of sawtimber on commercial forest land by species and county, Blue Mountain Area, Oregon, January 1, 1970 (Scribner rule)*

(In thousand board feet)

Species	All counties	Baker	Grant	Harney	Malheur	Morrow	Umatilla	Union	Wallowa
Softwoods:									
Ponderosa pine	53,200	5,900	25,100	6,300	--	3,100	6,400	3,500	2,900
Lodgepole pine	5,300	1,300	2,100	--	--	200	600	800	300
Douglas-fir	45,000	16,000	11,000	900	--	3,400	8,500	4,000	1,200
White fir	23,400	3,000	8,700	300	--	700	--	2,300	8,400
Grand fir	44,100	--	4,000	--	--	2,400	8,300	14,100	15,300
Subalpine fir	5,700	900	900	--	--	100	800	1,500	1,500
Western larch	26,200	4,500	7,100	--	--	1,000	5,100	6,700	1,800
Engelmann spruce	11,900	2,000	2,800	--	--	100	1,900	4,100	1,000
Mountain hemlock	200	--	--	--	--	--	--	200	--
Total	215,000	33,600	61,700	7,500	--	11,000	31,600	37,200	32,400
Hardwoods[1/]	100	--	100	--	--	--	--	--	--
All species	215,100	33,600	61,800	7,500	--	11,000	31,600	37,200	32,400

[1/] Consists of quaking aspen.

Table 38.--*Average annual mortality of growing stock and sawtimber on commercial forest land, by cause of death and by softwoods and hardwoods, Blue Mountain Area, Oregon, January 1, 1970*

Cause of death	Growing stock			Sawtimber (International 1/4-inch rule)			Sawtimber (Scribner rule)		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			*Thousand board feet*					
Fire	400	400	--	2,200	2,200	--	1,800	1,800	--
Insect	11,700	11,700	--	52,600	52,600	--	46,400	46,400	--
Disease	10,600	10,600	--	52,400	52,400	--	46,900	46,900	--
Animal	100	100	--	--	--	--	--	--	--
Weather	11,200	11,200	--	52,700	52,700	--	46,900	46,900	--
Suppression	2,400	2,400	--	3,800	3,800	--	3,500	3,500	--
Logging	3,700	3,700	--	5,700	5,700	--	4,600	4,600	--
Other	800	600	200	7,400	7,400	--	6,500	6,500	--
Unknown	20,100	20,100	(1/)	68,100	68,000	100	58,500	58,400	100
All causes	61,000	60,800	200	244,900	244,800	100	215,100	215,000	100

1/ Less than 50,000 cubic feet.

Table 39.--*Net volume of salvable dead sawtimber on commercial forest land, by volume per acre class and county, Blue Mountain Area, Oregon, January 1, 1970*

Volume per acre	All counties	Baker	Grant	Harney	Malheur	Morrow	Umatilla	Union	Wallowa
					Thousand cubic feet				
Cubic feet:									
1-199	58,000	6,000	18,200	2,400	--	3,700	6,300	10,100	11,300
200-499	57,800	9,200	15,900	600	--	500	9,900	8,200	13,500
500-999	19,700	3,400	8,200	--	--	--	900	2,400	4,800
1,000-1,999	--	--	--	--	--	--	--	--	--
2,000 or more	--	--	--	--	--	--	--	--	--
All classes	135,500	18,600	42,300	3,000	--	4,200	17,100	20,700	29,600
					Thousand board feet, International 1/4-inch rule				
Board feet:									
1-499	74,300	7,000	18,300	1,100	--	3,500	14,000	18,800	11,600
500-999	204,400	23,500	66,200	9,300	--	15,300	17,700	27,000	45,400
1,000-2,499	274,400	38,600	92,600	3,700	--	4,900	46,500	34,400	53,700
2,500-4,999	92,400	19,100	26,100	--	--	--	10,800	17,100	19,300
5,000-9,999	9,600	--	9,600	--	--	--	--	--	--
10,000 or more	--	--	--	--	--	--	--	--	--
All classes	655,100	88,200	212,800	14,100	--	23,700	89,000	97,300	130,000
					Thousand board feet, Scribner rule				
Board feet:									
1-499	98,000	8,900	21,800	2,700	--	3,100	19,900	19,700	21,900
500-999	184,800	21,800	63,000	6,700	--	15,400	11,600	23,500	42,800
1,000-2,499	225,700	33,300	78,800	3,300	--	2,700	43,700	28,400	35,500
2,500-4,999	56,400	12,400	21,900	--	--	--	--	10,300	11,800
5,000-9,999	--	--	--	--	--	--	--	--	--
10,000 or more	--	--	--	--	--	--	--	--	--
All classes	564,900	76,400	185,500	12,700	--	21,200	75,200	81,900	112,000

Table 40.--Net volume of salvable dead sawtimber on commercial forest land, by volume per tree class and species, Blue Mountain Area, Oregon, January 1, 1970

Volume per tree	All species	Ponderosa pine	Lodgepole pine	Douglas-fir	White fir	Grand fir	Subalpine fir	Western larch	Engelmann spruce	Mountain hemlock
					Thousand cubic feet					
Cubic feet:										
1-49	16,300	2,200	600	7,600	1,700	700	--	1,900	1,600	--
50-99	21,000	4,500	2,300	5,600	1,700	1,000	800	4,700	100	300
100-499	98,200	25,600	3,700	17,300	3,100	3,300	2,800	36,000	6,400	--
500 or more	--	--	--	--	--	--	--	--	--	--
All classes	135,500	32,300	6,600	30,500	6,500	5,000	3,600	42,600	8,100	300
					Thousand board feet, International 1/4-inch rule					
Board feet:										
1-149	38,500	4,100	2,500	23,100	2,700	2,900	--	3,200	--	--
150-499	169,500	34,600	3,900	54,000	16,900	8,800	4,700	36,300	9,500	800
500-2,499	447,100	113,400	13,000	67,500	9,500	13,100	12,100	179,700	38,800	--
2,500 or more	--	--	--	--	--	--	--	--	--	--
All classes	655,100	152,100	19,400	144,600	29,100	24,800	16,800	219,200	48,300	800
					Thousand board feet, Scribner rule					
Board feet:										
1-149	47,400	3,700	2,400	27,300	2,400	2,100	--	2,800	6,700	--
150-499	196,600	45,300	8,800	50,400	14,200	11,300	4,400	55,500	6,100	600
500-2,499	320,900	87,800	4,400	47,900	8,500	6,800	9,700	128,900	26,900	--
2,500 or more	--	--	--	--	--	--	--	--	--	--
All classes	564,900	136,800	15,600	125,600	25,100	20,200	14,100	187,200	39,700	600

Table 41.--*Timber harvest by ownership class, Blue Mountain Area, Oregon, 1950-72 (International 1/4-inch scale)*

(In thousand board feet)

Year	All ownerships	Private	State	National Forest	Other public
1950	431,289	--	253,562	176,657	1,070
1951	506,932	--	331,133	174,729	1,070
1952	487,544	--	296,542	185,752	5,250
1953	503,249	315,116	--	174,838	13,295
1954	716,573	459,679	--	245,137	11,757
1955	703,202	442,011	--	261,182	9
1956	799,616	502,537	--	289,117	7,962
1957	732,516	455,241	--	263,434	13,841
1958	775,959	455,325	1,703	296,723	22,208
1959	891,218	493,105	2,006	379,233	16,874
1960	676,273	297,047	3,202	356,122	19,902
1961	708,438	313,362	545	375,718	18,813
1962	729,233	288,205	--	419,761	21,267
1963	797,162	243,768	4,467	536,605	12,322
1964	788,981	247,865	105	537,461	3,550
1965	871,768	244,967	910	623,703	2,188
1966	798,659	241,780	--	541,206	15,673
1967	827,988	246,804	--	563,890	17,294
1968	794,392	161,112	--	619,407	13,873
1969	777,690	171,982	870	594,497	10,341
1970	657,799	183,745	1,650	464,681	7,723
1971	809,819	187,017	2,691	607,007	13,104
1972	874,482	151,444	5,827	710,057	7,154

Reliability of Forest Resource Estimates

Forest Land Area and Timber Volume

The estimates of forest land area and timber volume in the Blue Mountain Area were derived by sampling and thus have sampling errors. Sampling errors have been computed for the estimates of commercial forest land area, noncommercial forest land area, net cubic-foot volume of growing stock, and net board-foot volume (International ¼-inch rule) of sawtimber. These sampling errors are presented in table 42 as a percent of the estimated total at the 68-percent and 95-percent probability levels. They may be interpreted as meaning that the odds are two out of three for 68-percent probability, or 19 out of 20 for 95-percent probability, that the ranges shown include the true value (i.e., the results of a 100-percent inventory). For example, we can expect, with 95-percent confidence, that the estimate of total commercial forest land area—4,565,000 acres ± 2.47 percent (112,756 acres)—includes the true value.

The sampling error of any breakdown these totals will be substantially greater th for the total. The smaller the breakdown, t larger the sampling error. An approximati of the increasing sampling error can be c tained from table 43, which shows the sa pling error associated with smaller estimat

In addition to measurable sampling erro there may be nonsampling errors due mistakes in judgment, measurement, and co pilation. The magnitude of errors of t nature cannot be determined. However, su errors are kept to a minimum through tra ing, supervision, field checking, and compl editing and machine verification in compil the data.

Table 42.--*Sampling errors of estimate of forest area and timber volume, Blue Mountain Area, Oregon, 1969*

Item	Estimated total	Sampling error in percent	
		68-percent probability	95-percent probability
Commercial forest land	4,565,000 acres	± 1.26	± 2.47
Noncommercial forest land[1/]	1,207,000 acres	± 3.77	± 7.39
Volume:			
Growing stock	10,376 million cubic feet	± 2.31	± 4.53
Sawtimber (International 1/4-inch rule)	46,550 million board feet	± 2.75	± 5.40

[1/] In addition to the estimated 1,207,000 acres of noncommercial forest land derived by sampling methods, 111,000 acres of productive reserved forest land and 137,000 acres of unproductive reserved forest land were determined by type-mapping procedures and have no sampling error.

Table 43.--*Approximate sampling error by size of estimate, Blue Mountain Area, Oregon, 1969*

Commercial forest land		Growing stock		Sawtimber	
Area	Sampling error[1/]	Volume	Sampling error[1/]	Volume	Sampling error[1/]
Thousand acres	*Percent*	*Million cubic feet*	*Percent*	*Million board feet, International 1/4-inch rule*	*Percent*
4,565	1.26	10,376	2.31	46,550	2.75
1,812	2.0	6,152	3.0	39,115	3.0
805	3.0	3,460	4.0	22,002	4.0
452	4.0	2,215	5.0	14,081	5.0
290	5.0	554	10.0	3,520	10.0
72	10.0	246	15.0	1,565	15.0
32	15.0	138	20.0	880	20.0
18	20.0	89	25.0	563	25.0
12	25.0	61	30.0	391	30.0
8	30.0				

[1/] By random sampling formula; 68-percent probability.

Inventory Procedures

This report on the forests of the Blue Mountain Area includes information gathered in the 1966-69 inventories of the Malheur, Umatilla, Wallowa-Whitman National Forests, and the Snow Mountain Ranger District and Crooked River Working Circle of the Ochoco National Forest conducted by Region 6 of the U.S. Forest Service; and the 1969 inventory of lands outside the National Forests conducted by the Forest Survey project to the Pacific Northwest Forest and Range Experiment Station. No updating was done to bring the data to a common date. Information on forest land in wildernesses and other National Forest reserved areas was carried forward from the previous inventory (in the mid-1950's). Information on forest land in reserved areas outside National Forests was gathered by the Forest Survey project in 1969.

National Forest Lands

Field plots were distributed on a systematic grid at 1.7-mile intervals on all National Forest lands.

There were 749 field plots established on the Umatilla National Forest, 639 on the Wallowa-Whitman, 766 on the Malheur National Forest, 126 plots on the Snow Mountain Ranger District of the Ochoco National Forest in Grant and Harney Counties, and 27 plots on the Crooked River Working Circle of the Ochoco National Forest in Grant County. Plots on all areas except the Crooked River Working Circle consisted of 10 sample points distributed systematically over an acre. The variable-radius plot samplir principle was used at each point to select th trees to be tallied. Where no trees were tallie a ground cover class was recorded. Circul 1/5-acre plots were measured on the Crooke River Working Circle. Summations of the pl tally expressed the timber resources ar conditions for each stand sampled. Data fro all plots were summarized to provide tot area, volume, growth, and mortali estimates.

Gross annual growth estimates c National Forest lands were for 1967-72 estimated from increment core readings of sample of trees on each 10-point plot. Mul ple regression equations were used to estima tree diameter 1 year ago, and net volume w computed for both present and past diam ters. Gross annual growth was obtained l subtracting past from present net volun Annual mortality is for 1957-72 and w obtained either from remeasurement of t 1/5-acre subplot used for the previous inve tory or from the newly established 10-poi plot. On the newly established 10-point pl mortality was based on tally trees which we estimated to have died within the past years.

Outside National Forests

A double sampling design was used f lands outside the National Forests. Fi 38,148 aerial photo sample plots were d tributed systematically across the area. Phc plots were classified into one of three ma land classes—commercial and noncommerc

forests and nonforest—and the commercial forest plots were further classified into stand volume classes. All photo plots were classified by kind of owner from public records.

The second stage consisted of a basic systematic grid of field plots 3.4 miles apart with supplemental plots added. A total of 789 field plots were established at photo plot locations. Each consisted of 10 sample points distributed systematically over an acre. Where no trees were tallied, a ground cover class was recorded. Summations of the 10-point tally expressed the resources and conditions for that acre and were used with the photo sample to provide area and volume estimates.

Annual growth estimates were developed from the diameter increment and mortality data measured on field plots, using a stand projection model (USDA Forest Service 1970). In Grant, Umatilla, Union, and Wallowa Counties, diameter increments came from remeasured trees on 1/5-acre plots originally established in the 1950's or from increment core readings from the 10-point tally when the 1/5-acre plot could not be relocated. In Baker, Harney, Malheur, and Morrow Counties, all growth estimates came from increment core readings on the 10-point tally. In Grant, Umatilla, Union, and Wallowa Counties, mortality estimates came from either the remeasured 1/5-acre plots or the 10-point plots in the event the remeasured plot was not located. In Baker, Harney, Malheur, and Morrow Counties, mortality was based on a sample of trees from the 10-point tally which were estimated to have died within the past 5 years.

Timber Harvest

The timber harvest figures for public lands have been compiled by the various agencies; information on timber harvest on private lands has been compiled by the State Forester.

Definition of Terms

Land Area

Total land area is that reported by the Bureau of the Census and includes dry land and land temporarily or partially covered by water (such as marshes, swamps, and river flood plains), streams, sloughs, and canals less than 1/8-mile wide, and lakes, reservoirs, and ponds less than 40 acres in area.

Forest land is at least 16.7 percent stocked by trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. Minimum area of forest land recognized is 1 acre.

Nonforest land has never supported forests or was formerly forested and is currently developed for nonforest uses. Included are areas used for agricultural crops, improved pasture, residential areas, city parks, improved roads of any width and their right-of-way clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of Census as land. If intermingled in forest areas, unimproved roads and other nonforest strips must be more than 120 feet wide, and clearings, etc., more than 1 acre in size, to qualify as nonforest land.

Forest-land Classes

Adverse location areas are productive forest land, often having merchantable stands of timber, but which, because of physical location, are impossible or difficult to harvest.

Commercial forest land is capable of producing 20 cubic feet per acre per year of industrial wood and not withdrawn from timber utilization.

Critical watersheds are areas well within the forest zone and sites above the 20 cubic feet per acre per year productivity level; but because of unstable soil and other conditions, cannot be logged without seriously affecting the watershed.

Deferred forest land is productive and has been administratively identified for study as possible additions to the Wilderness System or other withdrawal from timber utilization.

Noncommercial forest land is incapable of yielding crops of industrial wood because of adverse site conditions, and productive public forest land is withdrawn from commercial timber use through statute or administrative regulation.

Productive-reserved public forest land is withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualified as commercial forest land. Also included are forest areas managed exclusively for Christmas tree production.

Unproductive forest land is incapable of yielding crops of industrial wood products because of adverse site conditions such as sterile soil, poor drainage, high elevation, steepness, and rockiness.

Forest Types

Forest types are determined on the basis of species plurality of all live trees that contribute to stocking, considering both size and spacing.

Tree Classes

Growing Stock

Sawtimber trees, poletimber trees, saplings, and seedlings are included; that is, all live trees except cull trees.

Acceptable growing-stock trees are of commercial species and meet specified standards of size and quality, but do not qualify as desirable trees.

Desirable growing-stock trees are of commercial species, have no serious defects in quality limiting present or prospective use for timber products, are of relatively high vigor, and contain no pathogens that may result in death or serious deterioration before rotation age.

Sawtimber trees are 11.0-inch d.b.h. and larger, live, and of commercial species. Softwood trees must contain at least one 12-foot saw log with a top diameter not less than 6 inches inside bark; hardwood trees must contain at least one 8-foot saw log with a top diameter not less than 8 inches inside bark. At least 25 percent of the board-foot volume in a tree must be free of defect for either softwoods or hardwoods.

Poletimber trees are 5.0- to 10.9-inch d.b.h., live, and of commercial species, not less than 50 percent sound on a cubic-foot basis, and with no disease, defects, or deformities which are likely to prevent them from becoming growing-stock sawtimber trees.

Sapling and seedling trees are less than 5.0-inch d.b.h., live, of commercial species, and have no disease, defects, or deformities which are likely to prevent them from becoming growing-stock poletimber trees.

Nongrowing Stock

Cull trees are noncommercial species or commercial species which are too defective or which are unlikely to become growing-stock trees due to deformity, disease, low vigor, etc.

Sound cull trees are noncommercial species or commercial species with excessive defect due to form, roughness, etc.

Rotten cull trees have excessive defect due primarily to rot.

Mortality trees are commercial species which have died from natural causes within a specified period and which were not cull trees at the time of death.

Salvable dead trees are standing or down, of commercial species, 11.0 inches or more in diameter, containing 25 percent or more of sound volume and at least one merchantable 16-foot log if a softwood or one merchantable 8-foot log if a hardwood.

Stand-Size Classes

Sawtimber stands are at least 16.7 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees and with sawtimber stocking equal to or greater than poletimber stocking. In *large sawtimber stands*, the majority of the sawtimber stocking is in trees 21.0 inches and larger at breast height. In *small sawtimber stands*, the majority of the sawtimber stocking is in trees from 11.0 to 20.9 inches at breast height.

Poletimber stands are at least 16.7 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees, and with poletimber stocking exceeding sawtimber stocking.

Sapling and seedling stands are at least 16.7 percent stocked with growing-stock trees, with more than half of this stocking in saplings, seedlings, or both.

Nonstocked areas of commercial forest land are less than 16.7 percent stocked with growing-stocked trees.

Stocking

Stocking is an expression of the extent to which growing space is effectively utilized by present or potential growing-stock trees of commercial species. "Percent of stocking" is

synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

Age

Stand age is based upon growing-stock stocking. In order for a stand to be even-aged, a majority of the growing-stock stocking must be in two adjacent age classes. Stands that do not meet this criterion are classified as uneven-aged, under or over rotation age.

Rotation age is the period of years between establishment of a stand of timber and the time when it is considered ready for cutting—in lodgepole pine, 80 years; in all other softwoods, 120 years; in hardwood stands, 50 years.

In *old-growth sawtimber stands*, 50 percent or more of the growing stock is in trees at least 140 years old.

In *young-growth sawtimber stands*, more than 50 percent of the growing stock is in trees less than 140 years old.

Timber Volume

Live Sawtimber

Net volume of live sawtimber trees of commercial species is measured in board feet. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Scribner rule is the common board-foot log rule used locally in determining volume of sawtimber. Scribner volume is measured in terms of 16-foot logs.

International 1/4-inch rule is the standard board-foot log rule adopted nationally by the Forest Service for the presentation of Forest Survey volume statistics.

Saw-log portion is the bole of sawtimber trees between the stump and the saw-log top.

Upper-stem portion includes the bole f sawtimber trees above the saw-log top of 7 inches outside bark for softwoods and 8 inches outside for hardwoods to a minimu top diameter of 4.0 inches outside bark; or the point where the central stem breaks in limbs.

Growing Stock

Net volume in cubic feet of live sawtimb trees and live poletimber trees from stump a minimum 4.0-inch top (of central ste outside bark is measured. Net volume equ gross volume less deduction for rot a missing bole sections.

All Timber

Net volume in cubic feet of live a salvable dead sawtimber trees and poletimb trees of commercial species, also cull trees f all species from stump to a minimum 4.0-in top outside bark is measured.

Industrial Wood

All roundwood products, except fu wood are included.

Net Annual Growth

The net increase in volume of trees dur a specified year is included. (Components f net annual growth include: (a) the increm in net volume of trees at the beginning of e specified year surviving to the year's end, p (b) the net volume of trees reaching the se class during the year, minus (c) the t volume of trees that died during the ye minus (d) the net volume of trees that beca culls during the year.)

Ownership Classes

National Forest lands are Federal la which have been designated by Execut Order or statute as National Forests or pr chase units and other lands under the admi

Tree Species

ation of the Forest Service, including
perimental areas and Bankhead-Jones title
I lands.

Other public lands are Federal lands other
an National Forests, including lands ad-
inistered by the Bureau of Land Manage-
ent, Bureau of Indian Affairs, and mis-
llaneous Federal agencies, and lands owned
/ States, counties, and local public agencies
lands leased by these governmental units
r more than 50 years.

Forest industry lands are owned by com-
nies or individuals operating wood-using
ants.

Farmer lands are lands owned by opera-
rs of farms.

Miscellaneous private–corporate lands are
vned by companies or corporations that do
t operate wood-using plants. Included are
rporate farms, some railroad lands, oil
mpany lands, real estate and land-holding
mpany lands, and lands held by banks and
her financial institutions and various other
mpanies and corporations.

Miscellaneous private–noncorporate lands
e privately owned lands other than forest
dustry, farmer-owned, or corporate lands.

Principal tree species found on the commercial forest land in the Blue Mountain Area include:

Softwoods:
- Douglas-fir *(Pseudotsuga menziesii)*
- Engelmann spruce *(Picea engelmannii)*
- Grand fir *(Abies grandis)*
- Lodgepole pine *(Pinus contorta)*
- Mountain hemlock *(Tsuga mertensiana)*
- Pacific yew *(Taxus brevifolia)*[1]
- Ponderosa pine *(Pinus ponderosa)*
- Subalpine fir *(Abies lasiocarpa)*
- Western juniper *(Juniperus occidentalis)*
- Western larch *(Larix occidentalis)*
- Western white pine *(Pinus monticola)*
- Whitebark pine *(Pinus albicaulis)*
- White fir *(Abies concolor)*

Hardwoods:
- Black cottonwood *(Populus trichocarpa)*
- Hawthorn *(Crataegus* spp.*)*[1]
- Quaking aspen *(Populus tremuloides)*
- Red alder *(Alnus rubra)*
- White alder *(Alnus rhombifolia)*
- Willow *(Salix* spp.*)*[1]

[1] Noncommercial species.

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This report summarizes the findings of a timber resource inventory in Baker, Grant, Harney, Malheur, Morrow, Umatilla, Union, and Wallowa Counties in Oregon. Detailed tables of forest area, timber volume, growth, mortality, and cut are presented, along with a discussion of the present timber resource situation.

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timber resources and the timber economy of Okanogan County, Washington

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Abstract

In 1972, forest industries in Okanogan County, Washington, accounted for 23 percent of total employment and 29 percent of wages paid. Total forest industrial employment has increased since 1953 but represents a smaller proportion of total employment in the county due to the increase in other industries, mainly construction and trade. Timber harvest has nearly doubled since 1953, from 116 million board feet (Scribner scale) to 198 million. In 1972, 90 percent of the timber harvest was from public lands compared with 76 percent in 1953.

Timber supplies are projected to decline slightly—about 4 percent—by the year 2020, though the value is expected to increase about threefold. Employment in forest industries is projected to decline about 60 percent by the year 2020, but forest industrial payrolls only 27 percent.

KEYWORDS: Forest surveys, employment (forest labor), Washington (Okanogan County).

Preface

This report was prepared for the Pacific Northwest River Basins Commission's comprehensive Joint Plan for the Pacific Northwest. The Plan is being developed under the authority of Public Law 89-80, the Water Resources Planning Act of 1965. This report was financed by U.S. Forest Service, Region 6.

The basic forest resource data used in this report were collected by the Forest Survey project of the Pacific Northwest Forest and Range Experiment Station and the Okanogan National Forest in 1965-67. Updating of data to 1973 was done by Forest Survey.

Acknowledgment is made of the assistance of private companies, individuals, and public agencies in providing information for this report.

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Introduction

Okanogan is the largest county in the State of Washington with a total land area of 3,392,640 acres, yet it ranks 23d in total population, having 25,867 persons at the time of the 1970 census. Only five of the 39 counties in Washington are as sparsely populated in terms of people per square mile, and the least populated county, Ferry, borders Okanogan County on the east. Most of the people live in a few small towns along the Okanogan, Methow, Nespelem, and Columbia Rivers. Much of the county is mountainous, with the rugged Cascade Range in the western part and the lower Okanogan Highlands in the east. Annual precipitation ranges from about 10 inches at Omak to 60 inches in the far western part of the county in the high Cascades. The climate over much of the county is semiarid with hot summers, cold winters, and a rather short growing season.

Natural vegetation ranges from desert scrub in the low elevations, through extensive areas of very open ponderosa pine forests, grading into stands of Douglas-fir, to higher elevation forests of lodgepole pine, western larch, Engelmann spruce, and true firs.

An outstanding characteristic of Okanogan County is its remoteness from population centers. The nearest major city, Spokane, is 137 miles from Omak; Seattle is 236 miles from Omak across the Cascade Range. Construction of the North Cascades highway has greatly facilitated movement between Okanogan County and the western part of the State.

Okanogan County's population growth rate exceeded that of the State between 1890 and 1950. Between 1950 and 1960 Okanogan County's population declined 12 percent, while the State's population increased 20 percent. Since 1960 Okanogan County's population has remained fairly constant while the State's population has continued to rise sharply (fig. 1). Not immediately apparent in

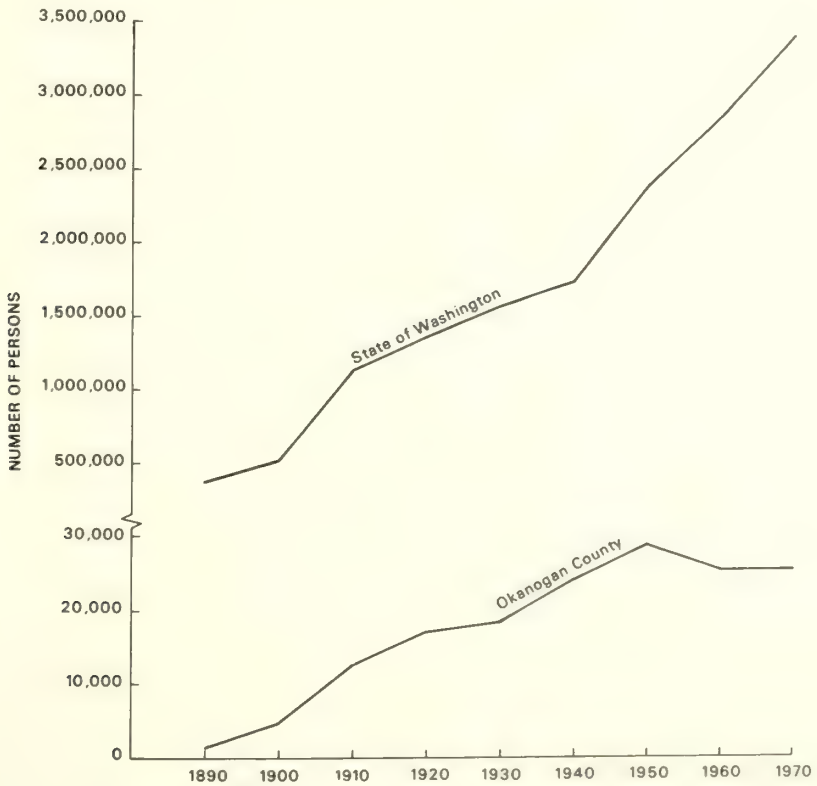

Figure 1.—Population of the State of Washington and Okanogan County, 1890 to 1970.

the population statistics is Okanogan's migration rate. Between 1960 and 1970, 1,328 more persons moved out than moved in, but a high birth-death ratio helped stabilize the county's population during this decade.

Total reported employment not counting State and Federal Government in Okanogan County has increased by 90 percent since 1950, in spite of a declining population. On the other hand, employment in the entire State has increased by only 74 percent, yet the population has increased by 43 percent.[1]

In 1972, the reported covered employment in Okanogan County was 7,122 people and the total wages paid was $55,416,172. Wholesale and retail trade employed the largest number of people but ranked fourth in total wages paid. Forest industries ranked second in employment and third in wages paid. Contract construction, fourth in employment, ranked first in wages paid. Other important sources of employment were government; services; agriculture; transportation, communication, and utilities; and finance, insurance, and real estate, in that order.

The Forest Industry

Employment by forest industries in Okanogan County was higher in 1972 than in 1950 (fig. 2), yet the proportion of total employment and wages attributable directly to forest industries decreased as other industries expanded. In 1950, forest industries accounted for 36 percent of the employment and 40 percent of the wages paid; and in 1972, they accounted for 23 percent of the employment and 29 percent of the wages paid. Industries that showed the greatest expansion in Okanogan County were:

Contract construction—employment up 320 percent and wages up 770 percent.[2]

Wholesale and retail trade—employment up 220 percent and wages up 240 percent.[2]

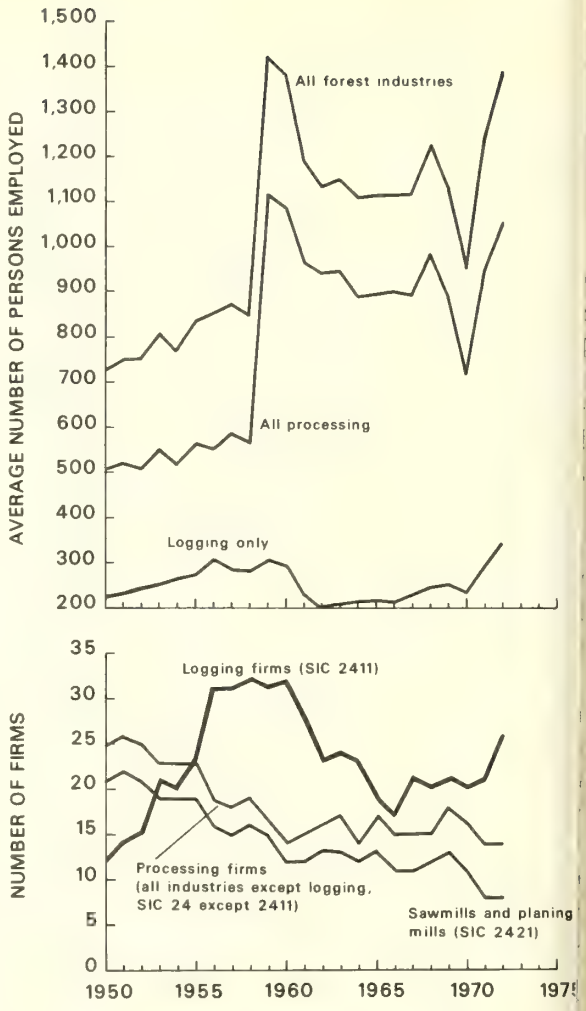

Figure 2.—Forest industry employment and number of forest industry firms, Okanogan County, Washington, 1950-72.

Services—employment up 225 percent and wages up 330 percent.[2]

The trend in the forest industry in Okanogan County, as in the region in general, has been from many firms to a few (fig. 2). In 1925 there were 22 sawmills. During the Depression years, in the 1930's, the number of sawmills dropped to 12 but then climbed

[1] Reported employment prior to 1960 is probably understated, making the apparent increase somewhat exaggerated. The comparison of the State with Okanogan County should still be valid, though.

[2] Wage comparisons are in terms of 1967 dollars.

back up to a high of 27 after World War II. By 1965 there were only 13; and in 1972, according to the Washington Department of Natural Resources (Bergvall and Ormrod, 1974), there were only 6 sawmills in the county. A plywood and veneer plant began operation in 1970.

Of the six sawmills in operation in the county, two are owned by the same major forest products company that owns the plywood and veneer plant. About 90 percent of the total log consumption in the county in 1972 took place in the three mills owned by this corporation. Until 1973, these mills were locally owned.

Installed 8-hour capacity of the six sawmills in Okanogan County is 432,000 board feet, lumber tally. Installed 8-hour capacity of the veneer and plywood plant is 190,000 square feet (3/8-inch basis).

Total log consumption in 1972 by all mills in Okanogan County was 167,442,000 board feet; 96 percent came from within Okanogan County; and according to the timber harvest reports, nearly 90 percent was from public and Indian lands (see tables 10 and 14). About 90 percent of the logs consumed were from old-growth (100 + years) trees. Douglas-fir made up 44 percent of the reported consumption and ponderosa pine ran a close second with 42 percent. Western larch amounted to 12 percent of the consumption and Engelmann spruce 2 percent. Small amounts (less than 0.5 percent) of other species reported as harvested in the county include lodgepole pine, true firs, white pine, and hardwoods.

Timber Harvest

Total reported timber harvest in Okanogan County in 1972 for all ownerships was 97,863,000 board feet (Scribner scale), the highest in history. Fifty-seven percent came from the Okanogan National Forest, 21 percent from the Colville Indian Reservation, and 12 percent from State lands. Forest industry lands contributed 2 percent of the timber and nonindustrial lands, 8 percent. There has been a generally long-term upward trend in timber harvest on public lands and a slight downward trend on private lands since 1953 (fig. 3); although since 1965, private lands have shown a slight upward trend.

Okanogan County's timber harvest has contributed an increasing proportion to the total State harvest—from 0.6 percent in 1925 to 2.8 percent in 1972.

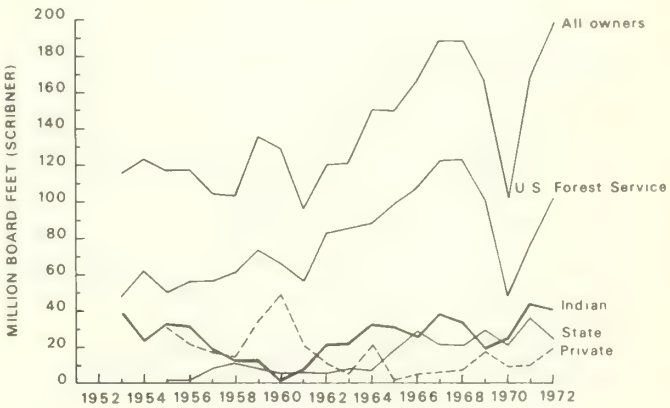

Figure 3.—Timber cut 1953-72, Okanogan County, Washington.

Timber Resources

Total area of commercial forest land[3] is estimated to be 1,618,000 acres or 48 percent of the total land area in the county. The Okanogan National Forest contains 765,000 acres or 47 percent of this, and the State 218,000 acres or 13 percent. Other public agencies, including Bureau of Land Management and Corps of Engineers, own 16,000 acres.

The Colville Indian Reservation contains 320,000 acres or 20 percent of the commercial forest land in the county. About 29,000 acres of commercial forest land are owned by forest industry, and another 45,000 acres are leased by forest industry for timber cutting. Farmer and miscellaneous private owners, excluding Indian land, hold 270,000 acres

[3] See "Appendix 2. Definition of Terms," page 30.

including the 45,000 leased by forest industry.

Forest Productivity Low

Okanogan County's forests are relatively low in productivity because of low precipitation, steep, rocky terrain, and the short growing season in mountainous areas. Only 16 percent of the commercial forest land is classified as capable of growing more than 85 cubic feet per acre per year, compared with 31 percent in all of eastern Washington and 42 percent in the entire State. Even this low figure needs further discounting. Studies in similar areas made since the Okanogan survey show that forests in the arid ponderosa pine fringe are capable of producing even less than formerly thought. In addition to limitations on yields, growing successive timber crops is difficult because of regeneration problems. These problems are severest in the lower elevation forests where most of the nonindustrial private lands occur, which partly explains why 64 percent of the private commercial forest land excluding Indian land in Okanogan County is less than 40 percent stocked with conifer trees, and 33 percent is nonstocked.

Timber Volume Declining

Total sawtimber volume in Okanogan County is estimated to be 10,165 million board feet (Scribner rule), and growing stock volume is estimated to total 2,780 million cubic feet. Over all ownerships, sawtimber volume has declined 2.3 percent in the past 5 years; private sawtimber declined 5.7 percent, National Forest sawtimber declined 2.6 percent, and other public sawtimber declined 0.4 percent. Douglas-fir, the most prevalent species, declined about 1.5 percent; and ponderosa pine, the second most prevalent species and historically the major timber species in much of eastern Washington, declined 6.5 percent. Western larch, the third most prevalent species, declined 11.4 percent. Other species, because they are presently used very little by the industry, increased in total volume. Included were lodgepole and white bark pines, Engelmann spruce, cedars, true firs, and hardwoods.

Future Timber Supplies

The Okanogan National Forest, the Colville Indian Reservation, and the State forest managed by the Department of Natural Resources are the three largest forest tracts in Okanogan County. Containing about 80 percent of the commercial forest land, they have contributed over 90 percent of the county's timber cut during the past 10 years. Each agency has a calculated "allowable cut" which reflects its management objectives and is based on current inventory volume, timber growth rates, and expected response to management activities. For these lands, the agencies' "allowable cut" figures were used as a basis for projecting timber supplies. For the 16,000 acres of other public lands, the average of the past 10 years' cutting was used as a sustainable harvest. For private lands, it was assumed that future timber harvests will decline slightly by the year 2020, due to a declining inventory of merchantable timber (see appendix 1 for detailed analysis). Following are the projected timber supplies from these ownerships.

Ownership	Projected annual timber supplies (Million board feet, Scribner) 1973-80	1980-2000	2000-2020
Okanogan National Forest	88.1	86.1	84.0
Colville Indian Reservation[4]	35.0	35.0	35.0
State	17.4	17.4	17.4
Other public	.8	.8	.8
Private	16.0	15.0	13.3
	157.3	154.3	150.5

[4] The Colville Indian Reservation does not hav an "allowable cut" for its Okanogan County land, bu for the entire reservation. The average cut for the pa several years—35 million board feet—was assumed t represent the allowable cut for that part of th reservation in Okanogan County.

The forest industry has been tooling up for handling smaller logs—down to 4-5 inches. As additional smaller material becomes available from thinnings and from fuller utilization of small and defective logs in timber stands being harvested, some additional volume beyond that shown above will become available. Only moderate increases in the use of mill residues can be expected, since in 1972, 92 percent of all mill residues were already being used.

Changing Species

Future timber harvests will consist of less ponderosa pine and western larch and more Douglas-fir, spruce, true firs, and possibly lodgepole pine. Though the Douglas-fir inventory is currently declining, this species is expected to hold its own in the future under the projected level of timber cutting. Much of the current ponderosa pine volume, especially on National Forest lands, occurs in association with more tolerant species, mainly Douglas-fir. Partial cutting tends to reduce the amount of pine and favor the Douglas-fir in these stands. The private forest lands being converted to nonforest uses are mostly in the lower elevations in the ponderosa pine type.

Some effort is being made through planting and stand density control measures to perpetuate ponderosa pine on public lands, and western larch seedlings have been planted in a few areas. These activities will probably have little effect on the species mix available for industrial use during the projection period, though they help minimize the decline of ponderosa pine and larch in the mixed-conifer types.

The stumpage prices for various species have differed considerably; ponderosa pine has been worth about twice as much as east side Douglas-fir, though the trend seems toward equalization of prices. The shifting of species in the future is not viewed as a serious problem to the industry or to the economy of Okanogan County.

Projected Value of Future Timber Harvest

Though the total volume of timber available for industrial use is expected to decline slightly, the total value is expected to increase.

Stumpage prices in Okanogan County, though lower than regional price levels, have fluctuated more or less in concert with regional price trends (see fig. 4) for west side Douglas-fir. Future price trends in Okanogan are projected to approach regional and national prices. For these projections an annual rate of increase of 3 percent was used.[5]

Factors that would guide prices toward the regional average include:

A. Increased national and international demand for timber, which would bring in more prospective buyers of Okanogan timber.

B. As reserves of old-growth timber, especially the higher-valued west-coast Douglas-fir and old-growth ponderosa pine, are depleted, there will be less quality difference in timber from one locality to the next. Okanogan timber would be more like timber from other parts of the region.

C. As unroaded areas in Okanogan County become accessible and as technology in logging and processing develops, there will be fewer cost differences between Okanogan County timber and timber in other localities.

Table 1 shows the approximate volume and value of stumpage of timber sold on the Okanogan National Forest, the Colville Indian Reservation, and State lands from 1968 to 1973. Table 2 shows projected value of timber harvest for decadal years to 2020 for all ownerships, using average stumpage price from 1969 through 1973 and a 3-percent annual rate of increase.

[5] West side Douglas-fir stumpage prices have been projected to increase at an annual rate of 2-1/2 percent (USDA Forest Service 1973).

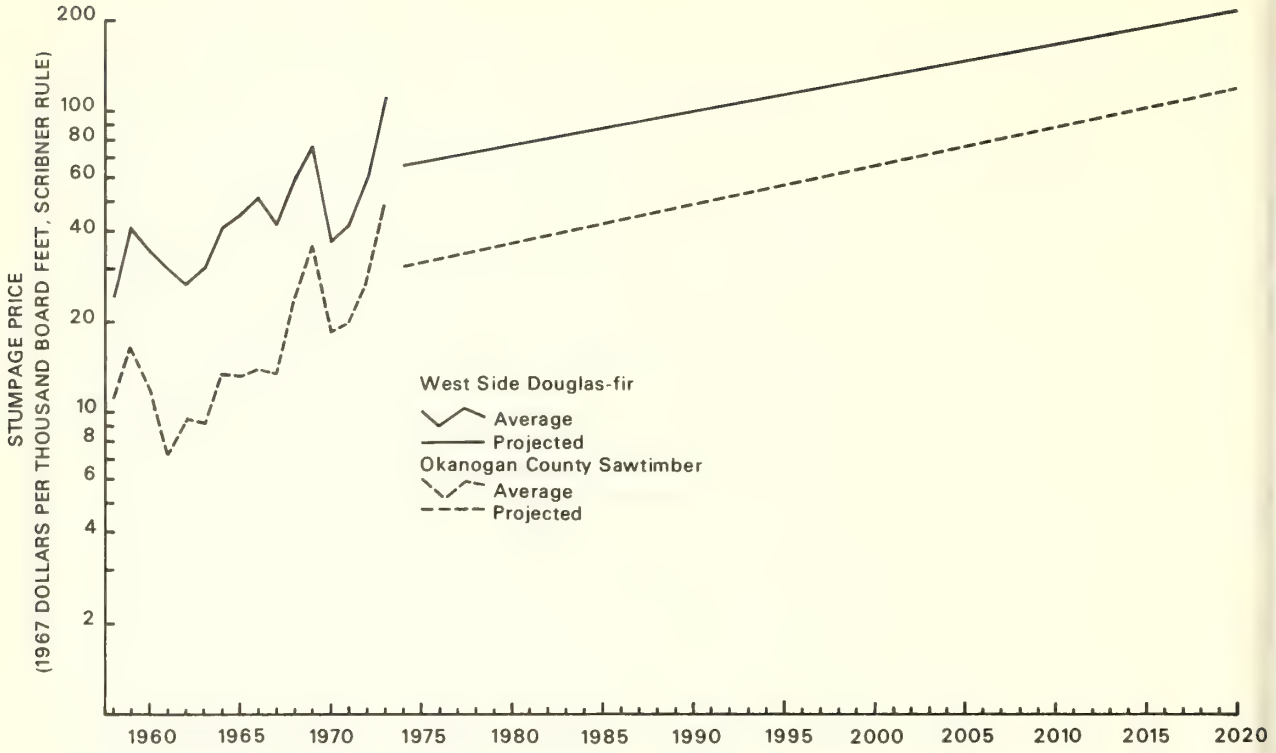

Figure 4.—Average stumpage prices for sawtimber sold on the Okanogan National Forest 1958-73, on the Colville Indian Reservation 1958-73, on State lands in Okanogan County 1968-73 and for Douglas-fir sawtimber sold on National Forests in western Oregon and Washington 1958-73, and projected stumpage prices to 2020. Projections for Okanogan County are based on the average for 1969-73 compounded at 3 percent per year. Projections for Douglas-fir are based on the average for 1969-73 compounded at 2-1/2 percent per year.

Table 1.--*Approximate volume and value of stumpage of timber sold on the Okanogan National Forest, the Colville Indian Reservation, and State lands in Okanogan County, Washington, 1968-73*

Year	Volume	Value	Average
	Million board feet, Scribner scale	*Thousands of 1967 dollars*	*1967 dollars per thousand board feet*
1968	167	3,908	23.40
1969	130	4,635	35.65
1970	137	2,466	18.00
1971	149	2,962	19.88
1972	165	4,353	26.38
1973	137	6,684	48.79

Sources of data: State of Washington Advertised Timber Sales Reports, U.S. Forest Service Region 6 Timber Cut and Sold Reports, Bureau of Indian Affairs Timber Sale Receipts Records.

Table 2.--*Projected value of timber harvest in Okanogan County, Washington using the average stumpage price from 1969 through 1973*

Year	Volume cut on all ownerships	3-percent annual increase	
		Mean value	Total value
	Thousand board feet, Scribner scale	*1967 dollars*	*Thousands of 1967 dollars*
1980	157,300	36.16	5,688
1990	154,300	48.59	7,497
2000	152,000	65.31	9,927
2010	150,500	87.76	13,208
2020	149,000	117.95	17,575

Trends in Forest Industrial Employment

Average annual employment in logging, sawmilling, and veneer and plywood production per unit of wood consumption has declined over time, reflecting the development of more efficient logging methods and conversion plants. This apparent increase in employee productivity is expected to continue in all areas. In Okanogan County, however, there are reasons to expect the future increase in productivity to be somewhat less than for the State or half-State. Okanogan County is nearly a closed system as far as current harvesting and processing of timber are concerned. Very little volume of unprocessed logs flowed into or out of the county in 1972. Future relationships could vary from those shown here should the timber flow pattern alter.

Logging employment[6] makes up about one-fourth of the total forest industrial employment in the county. Employment per unit of wood harvested is projected to decline only moderately. Even though the bulk of Okanogan's standing timber volume[7] is in old-growth stands and about 90 percent of the current timber harvest is in old-growth trees, Okanogan's forest has the lowest average volume per acre of Washington counties on the east slope of the Cascades—20 percent less than the average for all of eastern Washington. Both volume per acre and size of trees logged are expected to decrease in Okanogan County at a faster rate than in the half-State area. To harvest timber at the expected future rates, loggers will be working in sparser timber stands, in more difficult terrain, in the remote reaches of the county. The low productivity of Okanogan's forest land will also tend to require a higher level of employment per unit of wood harvested. Partially cut stands are expected to respond slowly to "release," and regeneration of denuded sites will often be difficult. Young-growth volume will build up at a slower rate than in the entire half-State area. Future stands will carry low per-acre volumes.

Employment in logging in 1972, and for the period 1968-72, averaged about 1.65 persons per million board feet cut. By the year 2020 it is projected to decline to about 1.50 persons per million board feet (fig. 5).

Lumber and all other wood products manufacturing[8] were combined for employment projection purposes. Though these industries have different rates of employee productivity for the entire State, the differences are considered negligible in this county. The veneer and plywood industry contributes only 14 percent of the total forest industrial employment. The veneer and plywood mill operated at near capacity in 1973. The current plywood market and the reported peeler log supply in Okanogan County suggest that further expansion of this industry is unlikely.

Sawing, planing, and millwork make up over 60 percent of the total forest industrial employment in the county. Though employment is projected to decline, it is not expected to decline as rapidly as in all of eastern Washington,[9] nor as rapidly as it appears to have declined since the peak years of 1959 and 1960. Sudden changes in future labor efficiency should not be expected in the two new mills and the older one that has recently been modernized. The trend from many small mills to a few large mills, an important factor in the declining employment rate, cannot continue much longer because very few small mills are left, and those that remain may be prolonged by the recent "small business set-aside" timber sales program on the National Forest. No pulp or paper plant will be built in or near Okanogan County in the State of

[6] Standard Industrial Classification (SIC) code 2411.

[7] Old-growth timber makes up somewhere between 70 and 85 percent of total volume, the exact amount depending on the unknown volume in old trees in "mixed age" stands.

[8] SIC 24 except 2411.

[9] Brian R. Wall and Daniel D. Oswald. A technique and relationships for projections of employment in the Pacific Coast forest products industries. USDA Forest Service Research Paper PNW-189, 49 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. 1975.

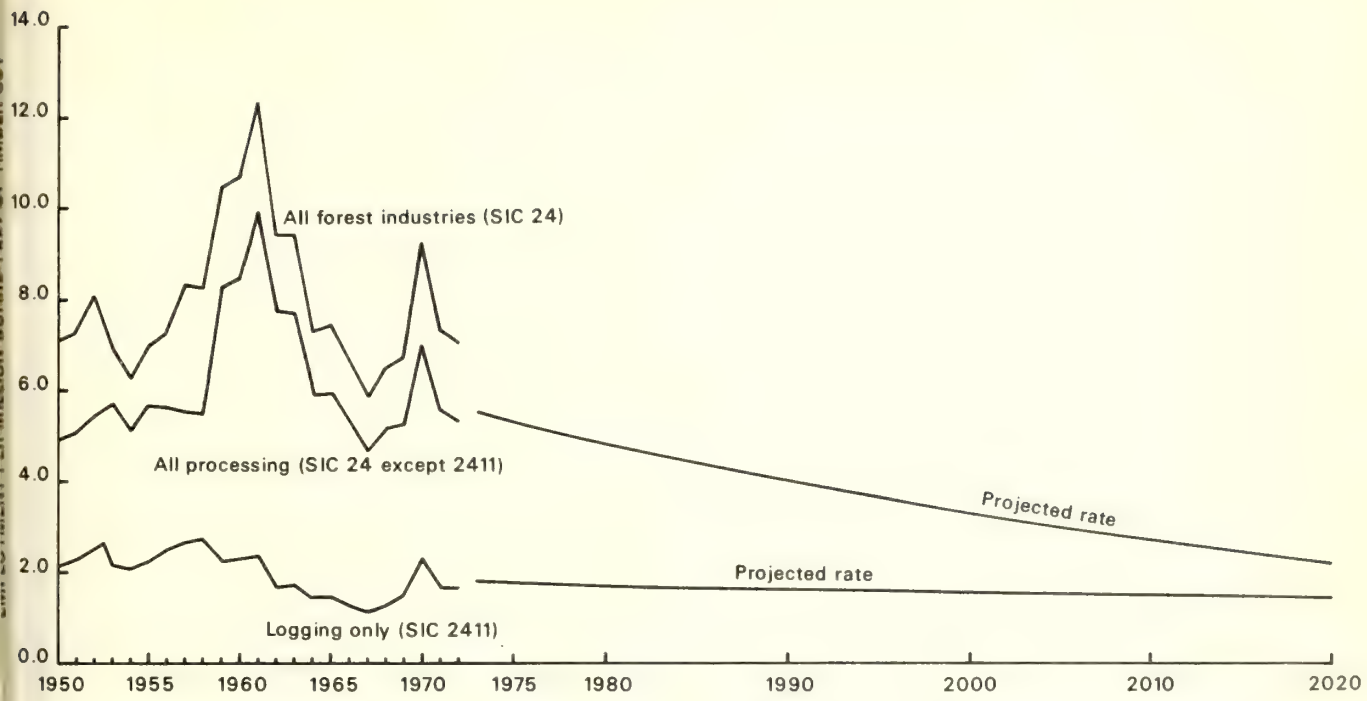

Figure 5.–Forest industrial employment per million board feet of timber cut in Okanogan County, Washington, 1950-72 with projections to 2020.

Washington in the foreseeable future due to the unavailability of water. However, it is possible that wood chips may be shipped out of the county in appreciable quantities in the future.

Employment in sawing, planing, millwork, and veneer and plywood production in Okanogan County averaged 5.53 persons per million board feet for the period 1968-72. Projections indicate it may decline to about 2.20 by 2020.

Employment per million board feet of timber cut in Okanogan County for logging and for sawing, planing, millwork, and veneer and plywood production for selected years between 1950 and 1972 and projected rates at 10-year intervals to 2020 are shown in the following tabulation.

Year	Industry[10]	
	Logging	Lumber and wood products manufacturing
	(Number of employees per million board feet of timber cut)	
1950	2.16	4.91
1955	2.27	4.67
1960	2.29	8.45
1965	1.45	5.97
1970	2.30	6.97
1972	1.72	5.30
1980	1.75	4.80
1990	1.67	4.00
2000	1.61	3.35
2010	1.53	2.70
2020	1.50	2.20

[10] Reported employment prior to 1960 is probably somewhat understated, thus tending to exaggerate the change between 1955 and 1960.

Total average annual employment in logging and lumber and wood products manufacturing in Okanogan County for selected years between 1950 and 1972 and projected employment at 10-year intervals to 2020 are shown below:

Year	Logging	Lumber and wood products manufacturing	Total employment
	(Number of employees)		
1950	223	506	729
1955	272	560	832
1960	296	1,090	1,386
1965	218	895	1,113
1970	237	718	955
1972	340	1,049	1,389
1980	275	755	1,030
1990	258	617	875
2000	245	509	754
2010	230	406	636
2020	224	328	552

Forest Industrial Payrolls

Total wages paid by all forest industries[11] in Okanogan County were $12.3 million in 1972 (10.2 million in 1967 dollars), an increase of about 100 percent in constant dollars since 1950. Average annual wages per person have climbed steadily from about $4,250 in 1950 to $7,300 in 1972 (fig. 6). Total wages per thousand board feet of timber harvested in the county have not changed in any discernible direction since 1950 but have varied inversely to the ups and downs of the timber harvest (fig. 7). When production is low, wages per unit of production are high and vice versa, since employment fluctuates much less than consumption and production.

Wages were projected under the assumption that a constant wage will be paid per unit of production, which means that as fewer employees are required to accomplish a unit of work, their wages will increase accordingly. Under this assumption, wages are projected to decrease to about $7.4 million in 2020. The projected values are not considered very reliable, since many factors that change payrolls could not be considered. The direction of the change, however, is reasonable under the assumption that past trends will continue and that external factors (such as a change in national policy on energy and other resources, and unforeseen technological innovation) will not upset current relationships. The following tabulations show wages paid in all forest

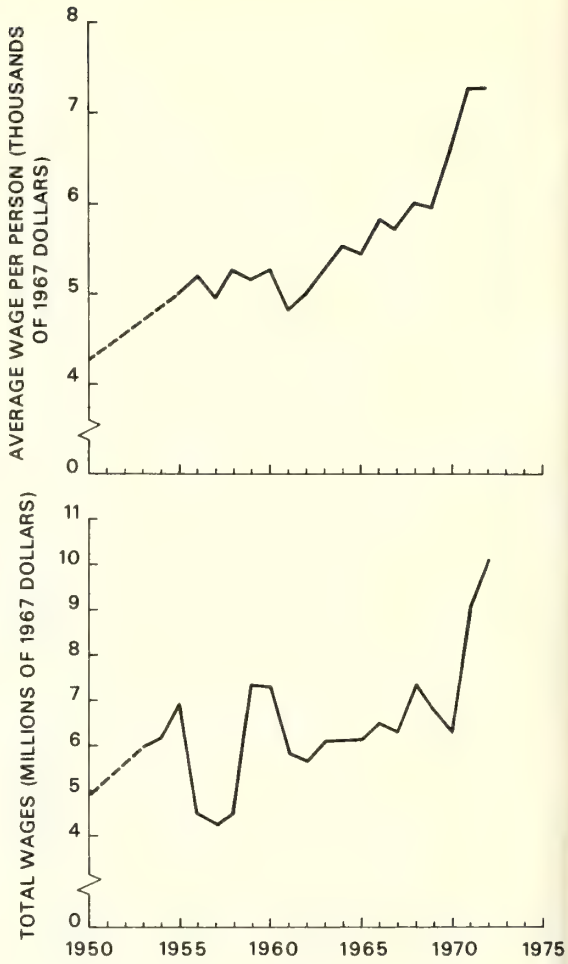

Figure 6.—Average annual per person and total wages paid by all forest industries, Okanogan County, 1950-72.

[11] All SIC 24.

Figure 7.—Wages per thousand board feet of timber cut, employment per million board feet of timber cut, and total timber harvested, Okanogan County, 1950-72. (All board feet Scribner scale.)

industries in Okanogan County during 1950, 1960, and 1972 and projected wages for 1980, 1990, 2000, 2010, and 2020.

Year	Total wages paid
	(In thousands of 1967 dollars)
1950	4,874
1960	7,303
1970	6,340
1972	10,179
	Projected wages[1 2]
1980	7,865
1990	7,715
2000	7,600
2010	7,525
2020	7,450

[1 2] Assuming increasing workman productivity with constant dollar "efficiency." Level assumed = $50 per thousand board feet cut (approximate average of past 5 years).

Table 3.--*Area by ownership and land class, Okanogan County, Washington, January 1, 1973*

(In thousand acres)

Ownership class	Forest land			Nonforest	Total land
	Commercial forest land[1]	Productive reserved	Unproductive		
National Forest	765	177	[2]396	161	1,499
Bureau of Land Management	12	--			
Miscellaneous Federal	4	--			
State	218	([3])			
Indian[4]	320	--	84	957	1,894
Forest industry	29	--			
Farmer	214	--			
Miscellaneous private	56	--			
All ownerships	1,618	177	480	1,118	[5]3,393

[1]Estimates of area of commercial forest land for specific ownerships may not agree with the owner's estimates because of differences in definitions and procedures.

[2]Includes about 161,000 acres in the Pasayten Wilderness.

[3]Less than 500 acres.

[4]Indian lands are private property held by the United States in trust for Indians. The Bureau of Indian Affairs manages tribal timber in accordance with principles of sustained yield, and timber on individually owned allotments upon consideration of the needs and best interests of the Indian owner and his heirs.

[5]U.S. Bureau of Census, Land and Water Area of the United States, 1960 (revised 1965).

Source: Bassett and Choate (1974).

Table 4.--*Area of commercial forest land, by forest type*[1] *and ownership class, Okanogan County, Washington, January 1, 1973*

(In thousand acres)

Type	National Forest	Other public[2]	Private	All ownerships
Douglas-fir	381	244	109	734
Ponderosa pine	142	180	57	379
True firs	29	9	--	38
Western larch	45	34	--	79
Engelmann spruce	40	21	9	70
Lodgepole pine	107	24	--	131
Whitebark pine	2	--	--	2
Other softwoods	1	--	--	1
Hardwoods	8	--	43	51
Nonstocked	10	42	81	133
All types	765	554	299	1,618

[1]Acres by forest type was determined by applying the January 1, 1968, forest type proportions to the January 1, 1973, total commercial forest area in each ownership. There is ample evidence that forest type conversion is taking place, but no way to quantify it is available.

[2]Includes Indian land.

Table 5.--*Area of commercial forest land, by cubic-foot site class and ownership class, Okanogan County, Washington January 1, 1973*

(In thousand acres)

Site class[1] (cubic feet)	National Forest	Other public[2]	Private	All ownerships
225 or more	0	0	0	0
165 to 224	2	0	0	2
120 to 164	4	0	9	13
85 to 119	104	111	33	248
50 to 84	458	347	194	999
20 to 49	197	96	63	356
All classes	765	554	299	1,618

[1]A classification in terms of capacity for cubic-foot annual growth per acre at culmination of mean annual growth.

[2]Includes Indian land.

Table 6.--*Volume of growing stock and sawtimber on commercial forest land, by species and ownership, Okanogan County, Washington, January 1, 1973*

Species	National Forest			Other public[1]			Private			All ownerships		
	Million cubic feet	Million board feet		Million cubic feet	Million board feet		Million cubic feet	Million board feet		Million cubic feet	Million board feet	
		International 1/4-inch	Scribner		International 1/4-inch	Scribner		International 1/4-inch	Scribner		International 1/4-inch	Scribner
Softwoods:												
Douglas-fir	747	3,673	3,144	337	1,431	1,227	123	378	314	1,207	5,482	4,685
Ponderosa pine	253	1,575	1,424	253	1,140	1,003	70	263	226	576	2,978	2,653
True firs	136	368	313	29	49	39	0	0	0	165	417	352
Western larch	114	625	568	148	664	565	9	43	30	271	1,332	1,163
Engelmann spruce	189	822	709	69	358	301	16	44	36	274	1,224	1,046
Lodgepole pine	208	187	151	40	36	29	0	0	0	248	223	180
Whitebark pine	8	16	14	2	0	0	0	0	0	10	16	14
Other softwoods	1	9	6	0	0	0	0	0	0	1	9	6
Total	1,656	7,275	6,329	878	3,678	3,164	218	728	606	2,752	11,681	10,099
Hardwoods	9	39	38	2	3	3	17	28	25	28	70	66
All species	1,665	7,314	6,367	880	3,681	3,167	235	756	631	2,780	11,751	10,165

[1] Includes Indian lands.

Table 7.--*Net annual growth of all growing stock on commercial forest land, by species and ownership class, Okanogan County, Washington*[1]

(In thousand cubic feet)

Species	National Forest	Other public[2]	Private	All ownerships
Softwoods:				
Douglas-fir	7,800	5,357	2,742	15,899
Ponderosa pine	1,500	5,315	2,021	8,836
True firs	1,500	711	--	2,211
Western larch	300	[3]-191	[3]-998	[3]-889
Engelmann spruce	2,300	1,119	166	3,585
Lodgepole pine	2,800	1,344	--	4,144
Whitebark pine	100	31	--	131
Total	16,300	13,686	3.931	33,917
Hardwoods	200	[3]-18	217	399
All species	16,500	13,668	4,148	34,316

[1]Net annual growth shown in this table is the average annual gross growth minus the average annual mortality measured on permanent forest inventory plots originally established in 1957-59 on the Okanogan National Forest and remeasured in 1965-66, and originally established on all other lands in 1958-59 and remeasured in 1967.

[2]Includes Indian land.

[3]Minus net growth is caused by mortality exceeding gross growth.

Table 8.--*Net annual growth of sawtimber on commercial forest land, by species and ownership class, Okanogan County, Washington (International ¼-inch rule)*[1]

(In thousand board feet)

Species	National Forest	Other public[2]	Private	All ownerships
Softwoods:				
Douglas-fir	38,900	22,629	5,982	67,511
Ponderosa pine	7,100	18,351	5,743	31,194
True firs	4,200	2,862	--	7,062
Western larch	[3]-300	[3]-1,515	[3]-2,916	[3]-4,731
Engelmann spruce	10,700	19,940	1,310	31,950
Lodgepole pine	3,400	4,024	--	7,424
Whitebark pine	300	--	--	300
Other softwoods	100	--	--	100
Total	64,400	66,291	10,119	140,810
Hardwoods	1,600	44	[3]-90	1,554
All species	66,000	66,335	10,029	142,364

[1]Net annual growth shown in this table is the average annual gross growth minus the average annual mortality measured on permanent forest inventory plots originally established in 1957-59 on the Okanogan National Forest and remeasured in 1965-66, and originally established on all other lands in 1958-59 and remeasured in 1967.

[2]Includes Indian land.

[3]Minus net growth is caused by mortality exceeding gross growth.

Table 9.--*Net annual growth of sawtimber on commercial forest land, by species and ownership class, Okanogan County, Washington (Scribner rule)*[1]

(In thousand board feet)

Species	National Forest	Other public[2]	Private	All ownerships
Softwoods:				
Douglas-fir	33,800	19,134	3,729	56,663
Ponderosa pine	6,400	16,029	4,973	27,402
True firs	3,500	2,238	--	5,738
Western larch	[3]-100	[3]-984	[3]-3,639	[3]-4,723
Engelmann spruce	9,300	15,944	1,142	26,386
Lodgepole pine	2,800	3,191	--	5,991
Whitebark pine	300	--	--	300
Other softwoods	100	--	--	100
Total	56,100	55,552	6,205	117,857
Hardwoods	1,400	44	[3]-84	1,360
All species	57,500	55,596	6,121	119,217

[1]Net annual growth shown in this table is the average annual gross growth minus the average annual mortality measured on permanent forest inventory plots originally established in 1957-59 on the Okanogan National Forest and remeasured in 1965-66, and originally established on all other lands in 1958-59 and remeasured in 1967.

[2]Includes Indian land.

[3]Minus net growth is caused by mortality exceeding gross growth.

Table 10.--*Okanogan County, Washington, timber harvest, 1945-72*

(In thousand board feet, Scribner scale)

Year	State	Other Non-Federal public	U.S. Forest Service	Indian	Other Federal	Private				All ownerships
						Industrial	Large non-industrial	Small non-industrial	Total	
1945	--	--	--	--	--	--	--	--	--	68,715
1946	--	--	--	--	--	--	--	--	--	71,426
1947	--	--	--	--	--	--	--	-	--	--
1948	--	--	--	--	--	--	--	--	--	--
1949	(1)	--	34,800	43,320	--	--	--	--	[1]19,622	97,742
1950	(1)	--	30,700	32,535	--	--	--	--	[1]39,652	102,887
1951	(1)	--	45,800	36,862	--	--	--	--	[1]20,320	102,982
1952	(1)	--	35,000	32,296	--	--	--	--	[1]25,521	92,817
1953	(1)	--	47,900	39,237	1,085	--	--	--	[1]27,819	116,041
1954	(1)	--	62,300	23,959	4,062	--	--	--	[1]33,014	123,335
1955	990	--	49,642	32,563	6,243	--	--	--	30,530	119,968
1956	3,249	--	56,900	30,162	4,636	--	--	--	22,880	117,827
1957	8,594	--	56,934	19,445	1,790	--	--	--	18,145	104,908
1958	10,308	--	61,030	12,448	4,130	--	--	--	15,415	103,331
1959	8,731	--	73,329	13,002	5,793	--	--	--	35,021	135,876
1960	5,075	--	67,503	2,098	5,226	--	--	--	49,318	129,220
1961	6,622	--	56,706	7,786	5,136	--	--	--	20,759	97,009
1962	6,034	--	83,100	20,350	286	--	--	--	11,284	121,054
1963	8,633	--	85,000	22,762	56	--	--	--	5,950	122,401
1964	7,444	--	87,200	32,419	562	--	--	--	22,438	150,063
1965	19,004	60	99,400	28,986	116	--	--	--	2,019	149,585
1966	28,601	--	106,400	25,324	1,905	--	--	--	5,080	167,310
1967	23,083	--	121,300	38,495	793	400	1,158	3,921	5,479	189,150
1968	21,711	--	121,600	34,135	3,200	2,373	1,401	4,992	8,766	189,412
1969	28,241	--	103,890	18,250	874	2,750	6,536	7,148	16,434	167,689
1970	21,771	--	47,474	23,952	5	4,377	890	4,819	10,086	103,288
1971	36,134	100	77,075	43,016	7	3,280	7,205	2,644	13,129	169,461
1972	24,432	--	111,848	41,020	--	4,713	7,850	8,000	20,563	197,863

Source: USDA Forest Service, timber harvest reports, 1945-72.

[1]1949-54 private and State combined.

Table 11.--*Installed 8-hour capacity of forest industry mills by class of mill, Okanogan County, Washington, 1972*

Class of mill	Number of mills	Total capacity per 8-hour shift
		Board feet (lumber tally)
Sawmill (installed capacity, board feet per 8-hour shift):		
Less than 80,000	3	67,000
80,000+	3	365,000
Total	6	432,000
		Square feet (3/8-inch basis)
Veneer and plywood mill	1	190,000

Source: Unpublished data collected by State of Washington Department of Natural Resources in its 1972 mill survey.

Table 12.--*Consumption of logs by class of mill and ownership, Okanogan County, Washington, 1972*[1]

(In thousand board feet, Scribner scale)

Class of mill	Ownership origin					
	National Forest	Indian	State	Private		Total consumption
				Own	Other	
Sawmill (installed capacity, board feet per 8-hour shift):						
Less than 80,000	6,553	0	0	90	766	7,409
80,000+	74,791	10,759	7,173	5,977	18,536	117,236
Total	81,344	10,759	7,173	6,067	19,302	124,645
Veneer and plywood mill	18,830	7,703	5,135	4,280	6,847	42,795
All mills	100,174	18,462	12,308	10,347	26,149	167,440

Source: Unpublished data collected by State of Washington Department of Natural Resources in its 197 mill survey.

Table 13.--*Consumption of logs from old-growth and young-growth timber, by class of mill, Okanogan County, Washington, 1972*

(In thousand board feet, Scribner scale)

Class of mill	Old-growth timber[1]	Young-growth timber	Total
Sawmill (installed capacity, board feet/8-hour shift):			
Less than 80,000	6,025	1,384	7,409
80,000+	105,512	11,724	117,236
Total	111,537	13,108	124,645
Veneer and plywood mill	38,516	4,279	42,795
All mills	150,053	17,387	167,440

[1]100+ years.

Source: Unpublished data collected by State of Washington Department of Natural Resources in its 1972 mill survey.

Table 14.--*Flow of logs to and from Okanogan County, Washington, 1972*
(In thousand board feet, Scribner scale)

Item	County of origin			County of use			
	Okanogan	Chelan	Total volume of logs used in Okanogan County	Okanogan	Ferry	Stevens	Total volume of logs originating in Okanogan County
Logs used in Okanogan County	159,967	7,475	167,442	--	--	--	--
Logs originating in Okanogan County	--	--	--	159,967	11,720	563	172,250

Source: Unpublished data collected by State of Washington Department of Natural Resources in its 1972 mill survey.

Table 15.--*Volume of logs consumed in Okanogan County, Washington, by class of mill and species, 1972*

(In thousand board feet, Scribner scale)

Class of mill	Douglas-fir	Ponderosa pine	Engelmann spruce	Western larch	Total
Sawmill	48,240	65,357	2,178	8,870	124,645
Veneer and plywood	25,677	4,279	2,140	10,699	42,795
Total	73,917	69,636	4,318	19,569	167,440

Source: Unpublished data collected by State of Washington Department of Natural Resources in its 1972 mill survey.

Tree Species

Principal tree species found on the commercial forest land in Okanogan County include:

Softwoods:
- Douglas-fir *(Pseudotsuga menziesii)*
- Engelmann spruce *(Picea engelmannii)*
- Grand fir *(Abies grandis)*
- Lodgepole pine *(Pinus contorta)*
- Mountain hemlock *(Tsuga mertensiana)*
- Ponderosa pine *(Pinus ponderosa)*
- Subalpine fir *(Abies lasiocarpa)*
- Western hemlock *(Tsuga heterophylla)*
- Western larch *(Larix occidentalis)*
- Western redcedar *(Thuja plicata)*
- Western white pine *(Pinus monticola)*
- Whitebark pine *(Pinus albicaulis)*[1 3]

Hardwoods:
- Black cottonwood *(Populus trichocarpa)*
- Quaking aspen *(Populus tremuloides)*
- Western paper birch *(Betula papyrifera* var. *commutata)*

[1 3] Found only in high mountains, often on noncommercial forest land.

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APPENDIX 1

Timber Supply Projections

PUBLIC AND INDIAN LANDS

Timber supply projections for Federal, State, and Indian lands were made under the assumption that the policies and conditions that affect the cutting level will not change. A discussion follows.

Okanogan National Forest

The current 10-year programed yield for the Okanogan National Forest is 881 million board feet (Scribner), or 88.1 million per year. The actual cut for a given year may be higher or lower than 88.1 million. In 1972 the cut was 111.8 million; the average for the past 5 years is 92.4 million. The total programed yield of 88.1 million includes 72.7 to be tractor-logged and 15.4 to be cable-logged. Some recent timber sales have been logged by helicopter. Increasing use of helicopter is making it possible to get to timber already programed for harvesting but not previously available without damaging other values. About 80 percent of the programed yield for the current cutting cycle is from regeneration cutting, and 18 percent is from commercial thinning. The balance is mortality salvage. Forest fires on the Okanogan National Forest have burned over 20,000 acres since the most recent timber inventory.[14] The Okanogan National Forest estimated that the allowable cut would be reduced by about 2 million board feet if the loss of timber growth by fire were considered. The forest decided not to reduce the cut at that time, because a reinventory of timber resources is planned for fiscal year 1976-77, and a new programed yield will be calculated. For this report the present allowable cut has been projected to 1980 at its present level of 88.1 million board feet, then reduced by 2 million for the period 1980-2000, and by 2.1 million for 2000-2020 for losses by fire.

No increases in yields over those shown in the timber management plan were assumed, because of the lack of knowledge as to how stands in marginal arid regions such as Okanogan County respond to various management intensities.

The present allowable cut does not include lodgepole pine. An increased interest in lodgepole pine would allow the 107,298 acres of this type to be placed in the programed yield category. According to the Okanogan National Forest timber management plan, this could increase the annual allowable cut by as much as 3.5 million board feet. However, lodgepole pine stands are remote, often in steep terrain, and on poor sites with short growing seasons. Logging would be costly because of the low per-acre volumes in lodgepole pine stands. There are also doubts that the present growth rate on some of the fragile sites could be maintained under a cutting program.

A number of factors have operated to keep timber yields relatively low. Some may be amenable to control in the future; others will probably have an increasing impact on yields.

Devastating fires have occurred and will probably continue. With the increasing use by recreationists, the greater intensity of roads, and more frequent entry into stands for management purposes, the chances of fires starting will be increased.

Insect and disease infestations have been common. Mistletoe is a problem in Douglas-fir, ponderosa pine, and western larch and tends to get worse as stands are opened up in logging or other activities. The larch casebearer has invaded the forest since the latest inventory. It doesn't usually kill trees outright but affects growth. Total impact may not be evident for years. There is some concern that

[14] There were four major fires: Forks (1970), Fourth of July Mountain (1968), Mitchell Creek (1970), and Honeymoon (1970).

the tussock moth may strike. It caused some damage on the Colville Indian Reservation in Ferry County immediately east of Okanogan County but was checked by DDT spraying in the summer of 1974. The spruce budworm has infested an extensive area of Douglas-fir type. A survey in September 1974 showed that visible defoliation had doubled since 1973 and that top-killing had begun due to repeated defoliation. Mortality has been light but could become serious if the infestation persists. Growth has been reduced an unknown but probably significant amount, since the budworm attacks young and old trees alike.

Additional land may be set aside for nontimber use; more forest land will be physically converted to roads, powerlines, and other developments. The forest currently holds eight applications for geothermal exploration, and in response to the renewed interest in minerals is reexamining about 800 mining claims. The new cross-State highway may bring in more recreationists and increase the pressure for nontimber use of the forest. Private land near the National Forest boundary is starting to sell for recreational development; this may affect timber cutting practices and reduce yields.

Colville Indian Reservation

Though there is no allowable cut as such for that portion of the Colville Indian Reservation in Okanogan County, in practice the cut has averaged about 35 million board feet over the past several years. The allowable cut for the entire reservation is based on present management intensity. Under more intensive management, an increase in annual cut could be expected, though some of the factors that have reduced yields on other lands may also affect reservation forests—mistletoe, spruce budworm, fire, and poor regeneration, for example.

State Lands

The allowable cut of 17.4 million board feet is not expected to change before the year 2000. The total inventory is expected to be reduced as the old stands on State land are cut for the first time. No quantitative estimate of the volume reduction is available. It is assumed that the 17.4 million board-foot annual cut can be sustained to the year 2020. The State's policy is to manage its Okanogan County lands as part of its total investment opportunity. In keeping with their mandate to maximize sustained economic benefits to the trusts to which the land is dedicated, they will invest forestry money on higher site lands elsewhere in the State. For this reason an increase in yields under present levels of demand and technology seems very unlikely.

PRIVATE LANDS

The net annual growth—which is gross growth less mortality for all private lands as estimated from plots originally established in 1958-59 and remeasured in 1967—was 6.1 million board feet (Scribner). This gives an average of 20.4 board feet per acre per year, or about 7 cubic feet per acre per year, extremely low even for arid Okanogan County. For all of central Washington, the net annual growth rate averaged 113 board feet, or 28 cubic feet, per acre. Gross growth for private lands was 21.3 million board feet, giving an average of 71.2 board feet or about 24 cubic feet per acre per year, over three times the net growth rate.

The high mortality rate which resulted in a low net growth during the remeasurement period was due largely to a forest fire that burned an unusually heavy stand of timber, and to old-growth larch trees dying from mistletoe. One might ask if the estimates of fire losses and larch mortality, both much greater on private lands than on public lands, are merely the results of a sampling accident, or could be logically explained as consequences of past events and natural phenomena.

The area burned and frequency of fires seem reasonable. The fire season is longer in the drier, lower elevations where private lands are. Stands are disturbed more often. There are probably more chances for fires to start, especially in areas of residential development and where there is continuous activity by people and machinery.

The heavy larch mortality by mistletoe might be the logical result of heavy logging, roadbuilding, and other stand-opening activities on private lands, which tend to promote the spread of light-demanding mistletoe. Furthermore, it may be true that larch mistletoe is naturally more virulent on the poorer forest sites in the lower elevations, in much the same way that ponderosa pine mistletoe, according to Daubenmire (1961), is found mainly in the habitat types associated with the poorest sites in the lower elevations of eastern Washington and northern Idaho.

For projecting timber supplies on private lands, the net growth of 6.1 million board feet was adjusted to 16.0 million by reducing the mortality to an expected future level. The future level of mortality was derived by assuming that future fires will burn average acres of timber instead of heavier stands, and that the larch mortality which has been generally confined to old trees will decrease as the old-growth trees are cut or die.

At first glance one might conclude that the 16 million board feet of growth would indefinitely maintain the inventory if 16 million feet were cut annually. This is not the case, because the stands with the heavier volumes—which are also the stands most likely to be logged first—are also the stands on which growth is occurring. This is true because on private lands there are essentially no old-growth stands that have ceased growing, and many areas that have been logged have not restocked well. About 80 percent of the conifer volume and 65 percent of the conifer growth are concentrated on less than 40 percent of the area, and more than 60 percent of the area is nonstocked to poorly stocked (33 percent is nonstocked).

Not only is stocking poor, but many stands are made up of diseased, damaged, and poorly formed trees. Nearly half of the medium- and well-stocked stands are infected with mistletoe. Douglas-fir and ponderosa pine, the two major species, as well as larch, are affected, which means that management opportunities such as thinning are limited without some kind of mistletoe control. Many trees are deformed by porcupines, other animals, and insects; damaged in logging, or growing in open stands on severe sites; and are of limited merchantability with large limbs clear to the ground.

Because of all these factors it was assumed that growth would not increase in the near future. Holding growth level for each volume-per-acre stand and cutting the larger volume stands first, it was estimated that a cutting rate of 16 million per year would reduce the total inventory 17 percent by the year 2000. Growth and inventory will start building up, though, in stands that now have low volumes so that by the year 2020 the total reduction in inventory will be only 14 percent of the 1973 level.

Since timber will become increasingly harder to get as the heavier stands are logged, a cutting rate somewhat related to the inventory level was assumed. For the period 1980-2000, the expected timber supplies from private lands were reduced to 15.0 million board feet; and for 2000-2020, they were reduced to 13.3.

Another factor that will probably reduce private timber yields somewhat will be the loss of commercial forest land to nonforest uses, such as road, powerline, and reservoir construction, grazing, and residential and recreational development. Since most nonforest developments do not take place without some timber cutting, the timber harvest levels projected to 2020 were not reduced.

APPENDIX 2

Definition of Terms

Land Area

Total land area is that reported by the Bureau of the Census and includes dry land and land temporarily or partially covered by water (such as marshes, swamps, and river flood plains), streams, sloughs, and canals less than 1/8-mile wide, and lakes, reservoirs, and ponds less than 40 acres in area.

Forest land is at least 16.7 percent stocked by trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. Minimum area of forest land recognized is 1 acre.

Nonforest land has never supported forests or was formerly forested and is currently developed for nonforest uses. Included are areas used for agricultural crops, improved pasture, residential areas, city parks, improved roads of any width and their right-of-way clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of Census as land. If intermingled in forest areas, unimproved roads and other nonforest strips must be more than 120 feet wide, and clearings, etc., more than 1 acre in size, to qualify as nonforest land.

Forest-Land Classes

Adverse location areas are productive forest land, often having merchantable stands of timber, but which, because of physical location, are impossible or difficult to harvest.

Commercial forest land is capable of producing at least 20 cubic feet per acre per year of industrial wood on a continuous basis and not withdrawn from timber utilization. Includes areas that are accessible and operable as well as areas that are currently inaccessible or inoperable. In Okanogan County forest land was classified as commercial on the basis of site index, unless steepness or rockiness precluded management for continuous crops of wood. For example, Douglas-fir site index 50 or lower, and ponderosa pine site index 40 or lower, indicate a productivity of less than 20 cubic feet per acre per year. Land for which average site index was higher than these was classified as commercial forest.

Noncommercial forest land includes unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions, and productive public forest land withdrawn from commercial timber use through statute or administrative regulation.

Productive-reserved public forest land is withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualified as commercial forest land. Also included are forest areas managed exclusively for Christmas tree production.

Unproductive forest land is incapable of yielding crops of industrial wood products because of adverse site conditions such as sterile soil, poor drainage, high elevation, steepness, and rockiness.

Forest Types

Forest types are determined on the basis of species plurality of all live trees that contribute to stocking, considering both size and spacing.

Tree Classes—Growing Stock

Sawtimber trees, poletimber trees, saplings, and seedlings are included; that is, all live trees except cull trees.

Sawtimber trees are 11.0-inch d.b.h. and larger, live, and of commercial species. Softwood trees must contain at least one 12-foot saw log with a top diameter not less than 6 inches inside bark; hardwood trees must contain at least one 8-foot saw log with a top diameter not less than 8 inches inside bark. At least 25 percent of the board-foot volume in a tree must be free of defect for either softwoods or hardwoods.

Poletimber trees are 5.0- to 10.9-inch d.b.h., live, and of commercial species, not less than 50 percent sound on a cubic-foot basis, and with no disease, defects, or deformities which are likely to prevent their becoming growing-stock sawtimber trees.

Sapling and seedling trees are less than 5.0-inch d.b.h., live, of commercial species, and have no disease, defects, or deformities which are likely to prevent their becoming growing-stock poletimber trees.

Stand-Size Classes

Sawtimber stands are at least 16.7 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees and with sawtimber stocking equal to or greater than poletimber stocking. In *large sawtimber stands*, the majority of the sawtimber stocking is in trees 21.0 inches and larger at breast height. In *small sawtimber stands*, the majority of the sawtimber stocking is in trees from 11.0 to 20.9 inches at breast height.

Poletimber stands are at least 16.7 percent stocked with growing-stock trees, with half or more of this stocking in sawtimber and poletimber trees, and with poletimber stocking exceeding sawtimber stocking.

Sapling and seedling stands are at least 16.7 percent stocked with growing-stock trees, with more than half of this stocking in saplings, seedlings, or both.

Nonstocked areas of commercial forest land are less than 16.7 percent stocked with growing-stock trees.

Stocking

Stocking is an expression of the extent to which growing space is effectively utilized by present or potential growing-stock trees of commercial species. "Percent of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

"Stocking percentages" express current area occupancy in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to fully utilize the forest land.

Full utilization of the site is assumed to occur over a range of basal area. As an interim guide, 60 percent of the normal yield table values has been used to establish the lower limit of this range which represents full site occupancy. This is called 100-percent stocking. The upper limit to full stocking has been set at 132 percent. Sites with less than 100-percent stocking represent understocking with less than full site occupancy. Overstocking is characterized by sites that have over 132-percent stocking.

Age

Stand age is based upon growing-stock stocking. In order for a stand to be even-aged, a majority of the growing-stock stocking must be in two adjacent age classes. Stands that do not meet this criterion are classified as uneven-aged.

Timber Volume

Live Sawtimber

Net volume of live sawtimber trees of commercial species is measured in board feet. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Scribner rule is the common board-foot log rule used locally in determining volume of sawtimber. Scribner volume is measured in terms of 16-foot logs.

International 1/4-inch rule is the standard board-foot log rule adopted nationally by the Forest Service for the presentation of Forest Survey volume statistics.

Growing Stock

Net volume of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark is measured in cubic feet. Net volume equals gross volume less deduction for rot and missing bole sections.

Net Annual Growth

The net increase in volume of trees during a specified year is included. (Components of net annual growth include: (a) the increment in net volume of trees at the beginning of the specified year surviving to the year's end, plus (b) the net volume of trees reaching the size class during the year, minus (c) the net volume of trees that died during the year, minus (d) the net volume of trees that became culls during the year.)

Ownership Classes

National Forest lands are Federal lands which have been designated by Executive order or statute as National Forests or purchase units and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones title III lands.

Other public lands are Federal lands other than National Forests, including lands administered by the Bureau of Land Management and miscellaneous Federal agencies, and lands owned by States, counties, and local public agencies or lands leased by these governmental units for more than 50 years.

Indian lands belong to Indians, either tribal, or individual allotments, and are managed by the Bureau of Indian Affairs for the Indian owners under Secretarial Regulations (25 CFR 141) promulgated by authority of the Act of June 25, 1910, as amended by the Act of June 18, 1934; the Act of April 30, 1964; and others.

Forest industry lands are owned by companies or individuals, other than Indians, operating wood-using plants.

Farmer-owned lands are owned by operators of farms, other than Indians.

Miscellaneous private lands are privately owned other than forest industry or farmer-owned lands, or Indian-owned lands.

Bolsinger, Charles L.

1975. Timber resources and the timber economy of Okanogan County, Washington. USDA Forest Serv. Resour. Bull. PNW-58, 32 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Timber resources and timber economy of Okanogan County, Washington, as of 1972 are summarized and projections are made to the year 2020.

Keywords: Forest surveys, employment (forest labor), Washington (Okanogan County).

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Keywords: Forest surveys, employment (forest labor), Washington (Okanogan County).

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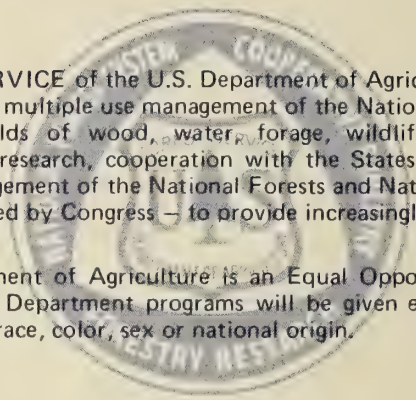

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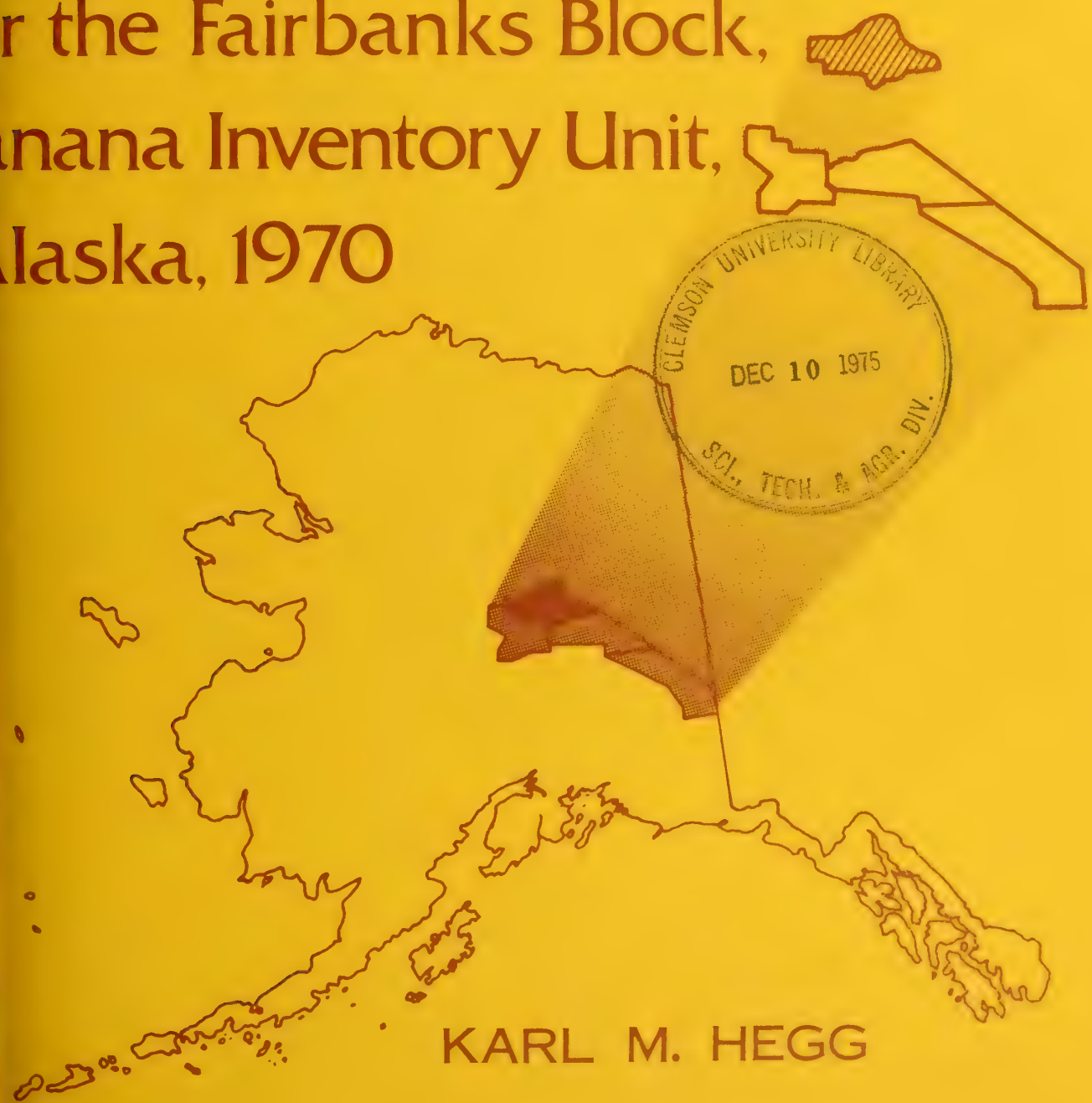
1975
USDA FOREST SERVICE RESOURCE BULLETIN PNW-59

TIMBER RESOURCE STATISTICS for the Fairbanks Block, Tanana Inventory Unit, Alaska, 1970



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PACIFIC NORTHWEST
FOREST AND RANGE EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE, FOREST SERVICE
Portland, Oregon

ABSTRACT

This report for the 3-million-acre Fairbanks block is the first of four on the 14-million-acre Tanana Valley inventory unit. Observations are made on forest condition, defect, stand regeneration, fire history, and present use. Data are provided for an operable noncommercial forest land category as well as for standard Forest Survey area and volume statistics. Commercial forest land occupies three-quarters of a million acres and has a net volume of 578 million cubic feet. Growing-stock volume on 51,000 acres of operable noncommercial forest land is 49.6 million cubic feet.

Keywords: Forest surveys (Tanana Valley, Alaska).

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PREFACE

This resource bulletin presents the findings of the first intensive inventory of that portion of the Tanana River drainage around the city of Fairbanks. This 3-million-acre area is identified as the Fairbanks block (fig. 1, p. viii).

Preparations for the Tanana inventory began in 1968 when a cooperatively funded contract was let for aerial photography of 11.3 million acres of the Tanana River Valley, which, with a 2.3-million-acre area previously photographed, make up the 13.6-million-acre Tanana drainage. Cooperators were Economic Development Administration (EDA), U.S. Department of Commerce; Bureau of Indian Affairs (BIA) and Bureau of Land Management (BLM), U.S. Department of the Interior; and Alaska Division of Lands (ADL), State of Alaska. The original intent was to inventory the valley as one unit, but poor flying weather and smoke haze slowed the photo project, so "blocks" within the Tanana River Valley inventory unit have been inventoried as photos became available.

This report is on the Fairbanks block, completed in 1971. The second block, the Kantishna, was completed in 1973 and will be the subject of the second report in this series. Reports on inventories of the other two blocks, Upper Tanana and Wood-Salcha, will be published as data become available.

Work on the Fairbanks block began in 1969 with photo interpretation of about 5,600 1-acre photo points. Photo interpretation, ownership determination, preparation, and fieldwork were a cooperative effort of ADL, BLM, BIA, and Forestry Sciences Laboratory (Juneau) of the Pacific Northwest Forest and Range Experiment Station. Supervision and editing of plot records were done by the Forestry Sciences Laboratory. Data processing was handled by the Pacific Northwest Forest and Range Experiment Station at Portland.

Forest Survey, authorized by the McSweeney-McNary Act in 1928 and extended to Alaska in 1954, is a nationwide effort conducted at various locations to obtain information on forest lands--their extent, condition, volume, growth, and depletion. The first inventories of the interior portion of Alaska were begun in 1956 and completed in 1962. These were extremely extensive inventories, and subsequently, areas with concentrations of commercial forest land have been defined for more intensive effort. In addition to the Fairbanks block, areas for which intensive inventories have been conducted and for which reports are available or pending are:[1/] Susitna Valley, Kuskokwim River, Copper River, Koyukuk, Tuxedni Bay, the Norton Bay Indian Reservation, and the Kantishna, Upper Tanana, and Wood-Salcha blocks of the Tanana unit.

[1/] The Susitna Valley and Koyukuk reports by Karl M. Hegg have been published by the Pacific Northwest Forest and Range Experiment Station: "Forest Resources of the Susitna Valley, Alaska" (USDA Forest Service Resource Bulletin PNW-32, 42 p., illus., 1970) and "Forest Statistics for the Upper Koyukuk River, Alaska, 1971" (USDA Forest Service Resource Bulletin PNW-54, 26 p., illus., 1974). The other reports will be prepared for publication by Forestry Sciences Laboratory, Juneau, Alaska, as data become available.

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METRIC CONVERSIONS

1 acre	= 0.4047 hectare
1 hectare	= 2.47 acres
1 cubic foot	= 0.0283 cubic meter
1 cubic meter	= 35.3145 cubic feet
1 cubic foot per acre	= 0.06997 cubic meter per hectare
1 cubic meter per hectare	= 14.29 cubic feet per acre
20 cubic feet per acre	= 1.3994 cubic meter per hectare
1 square foot basal area per acre	= 0.2296 square meter per hectare
1 square meter per hectare	4.356 square feet per acre

TIMBER RESOURCE STATISTICS FOR THE FAIRBANKS BLOCK, TANANA INVENTORY UNIT, ALASKA, 1970

Reference Abstract

Hegg, Karl M.
1975. Timber resource statistics for the Fairbanks block, Tanana inventory unit, Alaska, 1970. USDA For. Serv. Resour. Bull. PNW-59, 36 p.

This resource bulletin reports on the findings of the first intensive forest inventory of a 3-million-acre unit near Fairbanks, Alaska. Included are comments on forest condition, defect, regeneration, fire history, and present use. Standard Forest Survey data are presented for commercial forest land and a special noncommercial forest land class.

Keywords: Forest surveys (Tanana Valley, Alaska).

HIGHLIGHTS

Resource Bulletin PNW–59

1975

	Thousand acres	Thousand hectares
Total Fairbanks block area:	3,010.0	1 218.6
with forests	2,566.9	1 039.2
with nonforest	322.6	130.6
with noncensus water	41.3	16.7
with census water	79.2	32.1
Forested area breakdown:		
commercial forest land	748.0	302.8
noncommercial forest land:		
more than 800 cubic feet per acre	50.6	20.5
less than 800 cubic feet per acre	1,768.3	716.0

Commercial forest composition:

sawtimber	120.0	48.6
poletimber	246.6	99.8
seedlings and saplings	361.9	146.5
nonstocked	19.5	7.9

Volumes on commercial forest land:

	Thousand cubic feet	Thousand cubic meters	Thousand board feet [2/]	Thousand cubic meters [2/]
Total net volume	577,754.5	16 350.4	1,396,353.2	7 416.9
Total gross volume	607,252.2	17 185.2	1,483,900.6	7 727.5
Annual net growth	20,513.3	580.5	54,687.8	84.6
Annual net mortality	2,416.8	68.4	7,776.8	42.1

[2/] Volume in roundwood and softwood trees > 9.0-inch d.b.h. and hardwood trees > 11.0-inch d.b.h.

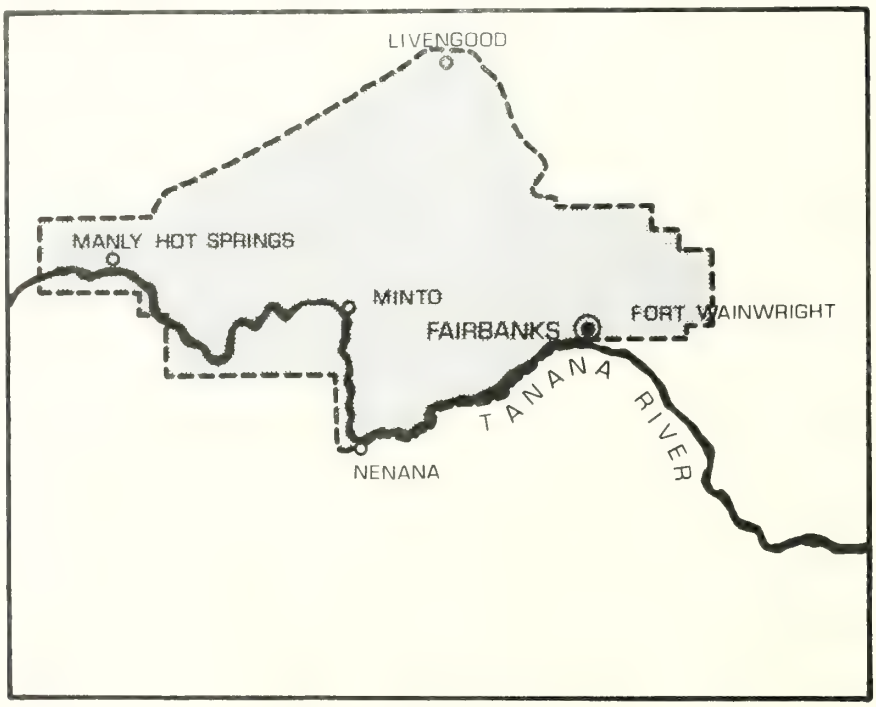

Figure 1.--The Fairbanks block of the Tanana Valley inventory unit.

OBSERVATIONS

Area and Location

The Fairbanks block (fig. 1) lies generally north of the Tanana River being bounded on the east and north by the heights of land dividing the Tanana and Yukon drainages. Geographically it lies within 64°30' and 65°30' north latitude, and 147° and 151° west longitude.

The major population center of the unit is Fairbanks and adjoining Fort Wainwright, with smaller populations at Livengood, Manly Hot Springs, Nenana, and Minto. Several semiabandoned gold mine towns also have a few permanent residents.

Gold mining left its mark on this area in several ways. Numerous trails criss-cross the area, and most river channels show old placer or dredge mining activities. The effect of these widespread activities is evident today in the varied age classes of timber stands creating a patchwork pattern. Man-caused fires probably have added significantly to this pattern.

Forest Description

Although fires have burned across a major portion of this unit, some of the finest mature white spruce[3/] stands in the State are found on the riverbanks and hillsides near Fairbanks (fig. 2). These remnant stands illustrate growth potential of the forests of this area. One stand a few miles west of Fairbanks has been reserved for study and research as the Bonanza Creek Experimental Forest. Sawtimber stands total about 120,000 acres or 16 percent of the commercial forest land in the Fairbanks block. Volumes of 15,000 board feet per acre are not uncommon, with an average volume per acre of 7,500 board feet for all sawtimber stands.

3/ Scientific names for trees are shown on page 5.

Figure 2.--A mature stand of white spruce in the vicinity of Fairbanks. Total height is about 100 feet with diameters to 25 inches.

The fire history of this unit shows more graphically in the seedling-sapling and poletimber stands. These stands comprise 608,500 acres (81 percent) of the 748,000 acres of commercial forest land.

Fire also appears to have changed land productivity and resulted in more commercial forest land. There is visual evidence that fires change marginal sites to a commercial category by removing the insulating duff and organic layer. The removal of this insulating layer increases insolation and increases depth to permafrost. Such sites, if presently classed as commercial, may in time revert to noncommercial black spruce or brush as the closing crown cover and accumulating duff increase ground insulation.

Commercial stands are found on almost all exposures and drainages. Generally, north slopes rounding to southeast and gently sloping to flat undrained areas are least likely to be or remain commercial. Commercial stands do, however, occur on all exposures, including north.

The best stands in this unit are located in the hills west of Fairbanks to Nenana and lying north of the Tanana River to the Chatanika drainage. Outside of that region, the other notable area is the Dugan Hills just west of the Minto Flats. The perimeter is bounded by the White Mountains on the east, north, and west; and only minor areas of commercial forest land are found there.

Forest Uses

Fairbanks is the trade center of northern Alaska and as such supports several basic industries. Among these is a sawmill and planing mill (the largest mill north of the Alaska Range), producing over 2 million board feet of lumber per year (fig. 3). There are several small sawmills in the Fairbanks vicinity, producing turned and sawn house logs, lumber, timbers, and pilings. However, some of these mills operate on an intermittent basis. Minor amounts of timber are also cut for fuelwood, generally as a byproduct of land clearing.

What impact the trans-Alaska pipeline may have on the timber economy is difficult to ascertain. At present, lumber shipped from the Pacific Northwest is competitive on the local market and may continue to be so. Large discount purchasing in the "lower 48" by the pipeline companies and shipment on their own vessels may make Alaska timber noncompetitive. The present lack of stumpage for sale in the Fairbanks area, as a result of the unsettled land ownership, can only aggravate the situation. Currently, available stumpage is selling for about $100 per thousand board feet, Scribner scale.

Already, there are indications of a more enduring market from Pacific Rim demands for logs, chips, cants, lumber, and pulp.

Major uses of the forests of this block are for recreation, hunting, and fishing. A fairly large population of moose is in the area, and many game fish are in the various rivers and lakes. Above all, the forests and land provide a scenic backdrop of dark evergreens contrasted with lighter green hardwoods with autumn change to gold.

Figure 3.--This Fairbanks sawmill produces about 2 million feet, board measure, per year. Output is in the form of standard dimension lumber, squared timber, and three-sided house logs.

Defect

The amount of defect in the stands of the Fairbanks block is, as would be expected for young stands, quite low. The deduction from gross volume for defect is: white spruce, 2 percent; balsam poplar, 11 percent; birch, 5 percent; and aspen, 4 percent. More mature stands have defect rates of about 3 percent for white spruce to 10-25 percent for hardwoods.

Regeneration

Less than 3 percent of the commercial forest area was classified as nonstocked, indicating little problem with regeneration. This is particularly so with hardwoods since all hardwood species have potential for prolific regeneration (fig. 4). However, white spruce continues to be a favored species in the marketplace, and management aimed at increasing space occupied by white spruce faces problems. White spruce regeneration is a principal study of the Institute of Northern Forestry at Fairbanks. Preliminary findings point up the highly cyclical nature of good seed years, the need for predicting them, and perhaps timber and sales management based on these predictions.

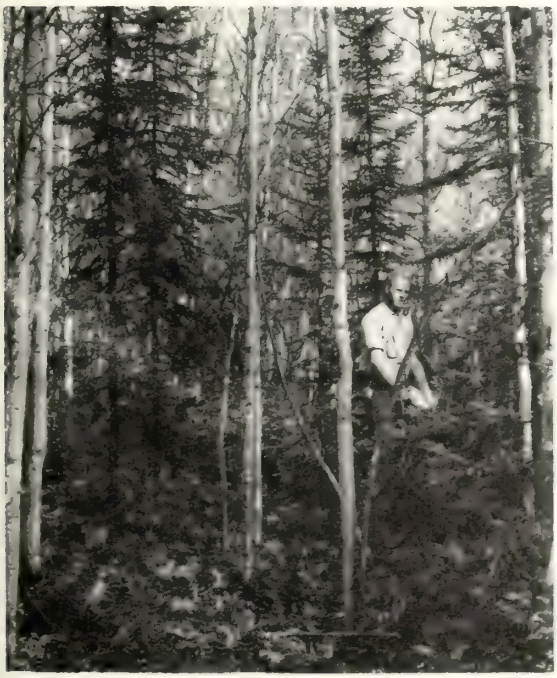

Figure 4.--Dense stands of hardwood regeneration are commonplace in interior Alaska. This aspen stand illustrates a well-stocked condition plus the initial stages of replacement by white spruce.

Growth and Mortality

In terms of cubic-foot growing stock, softwoods are growing at 2.0 percent of net volume and hardwoods at 5.2 percent. Because softwood stands contain a much higher volume per acre than hardwoods, the actual growth per acre is about the same--roughly 27 cubic feet annually. Growth rates in terms of sawtimber (board feet) show softwoods growing at 3.5 percent and hardwoods at 7.3 percent of net volume. Because softwoods average over 5,000 board feet per acre and hardwoods less than 1,000, the actual board-foot growth of sawtimber in softwood stands is much greater than in hardwood stands.

Since the softwood stands are much older than the hardwood stands, mortality follows a pattern similar to growth. Over half the area in softwood type is occupied by trees over 100 years old, whereas 66 percent of the hardwood stands are made up of trees less than 50 years old. The older trees are more susceptible to defect and mortality. some indication of this is found in table 28, which shows well over half the total mortality occurring in spruce.

SURVEY METHODS

The estimates of area and timber volumes are based on a double sampling procedure.[4/]

[4] C. A. Bickford. The sampling design used in the forest survey of the Northeast. Journal of Forestry 50: 290-293, 1952.

Enough points to satisfy specific levels of statistical precision were uniformly distributed on aerial photographs. At each of these photo points, 1 acre was classified by land type, forest type, and volume strata. A subsample was drawn from all land types and reexamined. All points in the subsample which were originally classified as commercial forest land as well as any other points questionably classified were visited on the ground.

For the Fairbanks block, we interpreted 5,628 photo points and reexamined 435 noncommercial and nonforest points. This reexamination served as a substitute ground check and yielded 66 questionable points which, with the 174 commercial forest and operable noncommercial points, totaled 240 locations actually checked on the ground. The ground plot was located at the exact point established on the photo. At each ground location a 10-point cluster of plots was measured. A 40 basal-area factor gage was used to select sample trees at each point for detailed measurements of size and vigor. Through data processing procedures, the total sample and the individual tree volumes were expanded to obtain the various data needed or specified on area and volume. However, the tables herein depart from the standard Forest Survey tables with addition of a noncommercial forest category called "operable." During the initial inventory of interior Alaska, we found that much noncommercial forest land had a relatively high per-acre volume. When more intensive inventories were begun in the mid-1960's, we and our cooperators agreed that some of this noncommercial strata had potential value as a commercial wood supply. By extrapolation, from cutting minimums of 3 cords per acre used in the Lake States and Canada, we established 9 cords or 800 cubic feet per acre as a prudent level for Alaska. This threefold increase in the minimum economic operating level should help compensate for the higher production and shipping costs in Alaska. The operable noncommercial areas presently have more than 800 gross cubic feet per acre in poletimber and sawtimber trees. The area and volume in this classification, although considered adequate for some cutting operations, should not be included in allowable cut computations. Future studies may show, through logging or other silvicultural practices, if these marginal sites can be managed as commercial forest land. None of the reported areas and volumes (whether classed as commercial or other) should be used in any calculation of an allowable cut without consideration of possible management and land use alternatives.

SAMPLING ERROR

The reliability of the inventory is expressed in terms of relative sampling errors.

	Design sampling error	Sampling error achieved	Sampling error of total volume or area reported
		Percent	
Area:			
Commercial forest land per million acres	3.0	5.0	±6.0
Noncommercial forest land per million acres	10.0	8.0	±6.0
Volume:			
Commercial forest land per billion cubic feet	6.0	6.0	±8.0
Commercial forest land growth per billion cubic feet	5.0	2.0	±12.0

For the Fairbanks-Tanana block, we report 577.8 million cubic feet of net growing-stock volume ± 8 percent. If repeated samples were taken of this population, the chances are two in three that the true total volume is between 531.6 and 624.0 million cubic feet.

We exceeded our design sampling error for area (3.0) and met the design error (6.0) for commercial forest land volume.

PRINCIPAL TREE SPECIES OF ALASKA[5/]

Softwoods:	
Black spruce	*Picea mariana* (Mill.) B.S.P.
Tamarack	*Larix laricina* (Du Roi) K. Koch
White spruce	*Picea glauca* (Moench) Voss
Hardwoods:	
Balsam poplar	*Populus balsamifera* L.
Black cottonwood	*Populus trichocarpa* Torr. & Gray
Paper birch	*Betula papyrifera* Marsh.
Quaking aspen	*Populus tremuloides* Michx.

TERMINOLOGY

Allowable cut.--The volume of timber that would be cut on commercial forest land during a given period under specified management plans for sustained production such as those in effect on National Forests.

Area condition class.--Area condition class provides a general stratification of commercial forest land by management opportunity class as indicated by the stocking or area controlled by tree and cover class.

Area Condition Classification

Code	
10	Areas 100 percent or more stocked with desirable trees and not overstocked. Stands in this category generally do not require any treatment at present to maintain high level of growth.
20	Areas 100 percent or more stocked with desirable trees and overstocked. Stands in this category need a treatment such as thinning to produce maximum levels of growth of desirable trees.

5/ Scientific names are according to Elbert L. Little, Jr., Check list of native and naturalized trees of the United States (including Alaska). Agriculture Handbook No. 41, 472 p. USDA Forest Service, Washington, D.C., 1953.

30 Areas 60 to 100 percent stocked with desirable trees and with less than 30 percent of the area controlled by acceptable growing-stock trees, cull trees, inhibiting vegetation, slash, or nonstockable conditions. Stands in this category generally have conditions favorable for natural improvement of stocking without special treatment.

40 Areas 60 to 100 percent stocked with desirable trees and with 30 percent or more of the area controlled by other trees (or overstocked areas) or conditions that ordinarily prevent occupancy by desirable trees. Stands in this category generally have little prospect for improvement in desirable tree stocking without special treatment such as thinning, cull tree removal, etc.

50 Areas less than 60 percent stocked with desirable trees but with 100-percent or more stocking with growing-stock trees. Stands in this category generally have little prospect for improved desirable tree stocking without special treatment. Stands almost to rotation age would usually not be treated.

60 Areas less than 60 percent stocked with desirable trees but with 60- to 100-percent stocking with growing-stock trees. Stands in this category generally have little prospect for improved desirable tree stocking without special treatment such as timber stand improvement or planting.

70 Areas less than 60 percent stocked with desirable trees and with less than 60-percent stocking with growing-stock trees. Stands in this category generally have little prospect for improved desirable tree or growing-stock stocking without treatment such as site preparation and regeneration, etc.

Commercial species.--Trees presently or prospectively suitable for industrial products.

Cull.--Portions of a tree unusable for industrial products because of rot, form, or other defect.

Cull trees.--Live trees of sawtimber or poletimber size unmerchantable for saw logs now or prospectively because of defect, rot, or species.

Rough trees: Live trees of 5.0-inch and larger d.b.h. that do not contain a saw log now or prospectively, primarily because of roughness, poor form, or because they are a noncommercial species.

Rotten trees: Live trees of 5.0-inch and larger d.b.h. that do not contain a saw log now or prospectively, primarily because of rot.

Forest land.--Land at least 16.7 percent stocked by forest trees of any size, or formerly having such tree cover, and not currently developed for nonforest use.

Commercial forest land: Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. Areas qualifying as commercial forest land have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood under management.

Noncommercial forest land: Unproductive forest land incapable of yielding crops of industrial wood because of adverse site conditions (producing less than 20 cubic feet per acre per year) and productive forest land withdrawn from commercial timb

use through statute or administrative regulation.

Noncommercial operable--noncommercial forest land with a gross volume in excess of 800 cubic feet per acre.

Noncommercial inoperable--noncommercial forest land with a gross volume of less than 800 cubic feet per acre.

Forest types.--A classification of forest land based on the species forming a plurality of the live tree stocking.

Spruce: Forests in which a plurality of the stand is white spruce. Common associates include birch, aspen, and cottonwood.

Cottonwood: Forests in which a plurality of the stand is black cottonwood or balsam poplar or both. Common associates include white spruce and birch.

Aspen or birch: Forests in which a plurality of the stand is aspen or paper birch, or both. Common associates include black cottonwood and white spruce.

Growing-stock trees.--Sawtimber trees, poletimber trees, saplings, and seedlings; that is, all live trees except cull trees.

Desirable trees: Growing-stock trees with no serious defects in quality limiting present or prospective use, relatively high vigor, and no pathogens that could result in death or serious deterioration before rotation age. They include the type of trees forest managers aim to grow; that is, the trees left in silvicultural cutting or favored in cultural operations.

Acceptable trees: Trees meeting the specifications for growing stock but not qualifying as desirable.

Hardwoods.--Dicotyledonous trees, usually broad leaved and deciduous. Alaska hardwood species are paper birch, quaking aspen, black cottonwood and balsam poplar.

Inhibiting vegetation.--Cover sufficiently dense to prevent establishment of tree seedlings.

International 1/4-inch rule.--A rule used to determine the tree volume in board feet.[6/]

Land area.--The area of dry land and land temporarily or partly covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than 120 feet wide; and lakes, reservoirs, and ponds less than 1 acre in area.

Log grades.--A classification of logs based on external characteristics as indicators of quality or value.

Mean annual increment (MAI).--A measure of the volume of wood, in cubic feet, produced on 1 acre during 1 year. Forest Survey minimum standard for commercial forest land is the ability to produce 20 cubic feet per acre per year.

Mortality.--Number or sound-wood volume of live trees dying from natural causes during a 5-year period.

Net annual growth of growing stock.--The annual change in volume of sound wood in live sawtimber and poletimber trees.

6/ Donald Bruce and Francis X. Schumacher. Forest mensuration. 483 p. McGraw-Hill Book Co., New York, 1950.

Net annual growth of sawtimber.--The annual change in net board-foot volume of live sawtimber trees.

Net volume.--The gross volume of a tree less deductions for rot, sweep, or other defect affecting product use.

Growing-stock volume: The net volume of sound wood in the bole of growing stock, culls, and salvable dead trees 5.0 inches and larger in diameter at breast height, from stump to a minimum 4.0-inch top outside bark or to the point where the central stem breaks into limbs.

Noncommercial species.--Tree species of typically small size, poor form, or inferior quality which normally do not develop into trees suitable for industrial products.

Nonforest land.--Land that does not qualify as forest land. Includes land that has never supported forests and lands formerly forested where forest use is precluded by development for nonforest uses, such as crops, improved pasture, residential areas, and city parks. Also includes improved roads and certain areas of water classified by the Bureau of the Census as land. Unimproved roads, streams, canals, and nonforest strips in forest areas must be more than 120 feet wide, and clearings in forest areas must be more than 1 acre in size, to qualify as nonforest land.

Nonstockable land.--Areas of forest land not capable of supporting forest growth because of rock, water, etc.

Salvable dead trees.--Standing dead trees that are considered currently or potentially merchantable by regional standards. A poletimber tree must be more than one-half sound; a sawtimber tree more than one-third sound (board measure).

Saw log.--A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight, and with a minimum diameter inside bark of 6 inches for softwoods (8 inches for hardwoods).

Saw log portion.--That part of the bole of sawtimber trees between the stump and the saw log top.

Saw log top.--The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7.0-inch d.o.b. (diameter outside bark) for softwoods and 9.0-inch d.o.b. for hardwoods.

Site classes.--A classification of forest land by its capacity to grow crops of industrial wood.

Softwoods.--Coniferous trees, usually evergreen with needles or scalelike leaves.

Stocking.--The degree of occupancy of land by trees, measured by basal area or the number of trees in a stand by size or age and spacing, compared with the basal area or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

Overstocked areas: Areas where growth of trees is significantly reduced by excessive numbers of trees.

Nonstocked areas: Commercial forest lands less than 16.7 percent stocked with growing-stock trees.

Stand-size classes.--A classification of forest land based on size of the growing stock present; that is, sawtimber, poletimber, or saplings and seedlings.

Sawtimber stands: Stands at least

16.7 percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands: Stands at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

Sapling-seedling stands: Stands at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and seedlings.

Tree-size classes.--A classification based on the diameter of the tree at breast height (4-1/2 feet above the ground on the uphill side of the tree):

Sawtimber-size tree:
Softwood tree of 9.0-inch d.b.h. and larger.
Hardwood tree of 11.0-inch d.b.h. and larger.

Poletimber-size tree:
Softwood tree of 5.0- to 8.9-inch d.b.h.
Hardwood tree of 5.0- to 10.9-inch d.b.h.

Sapling-size tree: A tree of 1.0- to 4.9-inch d.b.h.
Seedling-size tree: A tree of less than 1.0-inch d.b.h.

Upper stem portion.--That part of the main stem or fork of sawtimber trees above the saw log top to a minimum top diameter of 4.0-inch outside bark or to the point where the main stem or fork breaks into limbs.

Water.--Bureau of the Census definition: Streams, sloughs, estuaries, and canals more than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

Forest Survey: The same as the Bureau of the Census definition, except minimum width of streams etc. is 120 feet and minimum size of lakes etc., is 1 acre.

Table 1.--*Area of forest land by land class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

Land classes	Thousand acres
Forest land:	
Commercial	748.0
Noncommercial	
Operable	1/ 50.6
Inoperable	2/ 1,768.3
Total	2,566.9
Nonforest land	3/ 363.9
Total land	2,930.8
Census water	79.2
Total area	3,010.0

1/ Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

2/ Inoperable noncommercial forest land is defined as areas supporting a gross volume of less than 800 cubic feet per acre.

3/ Includes swampland, industrial and urban areas, other nonforest land, and 41,300 acres, classed as water by Forest Survey standards, but defined by the Bureau of the Census as land.

Table 2.--*Area of commercial and operable noncommercial*[1/] *forest land, by stand-size class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand acres)

Stand-size class	Forest land		
	Commercial	Operable noncommercial	Total
Sawtimber stands	120.0	5.0	125.0
Poletimber stands	246.6	40.9	287.5
Seedling and sapling stands	361.9	4.7	366.6
Nonstocked areas	19.5	0	19.5
Total	748.0	50.6	798.6

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 3.--*Area of commercial and operable noncommercial*[1/] *forest land, by stand volume class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand acres)

Stand volume class (board feet per acre)[2/]	Forest land		
	Commercial	Operable noncommercial	Total
0 - 799	501.5	16.6	518.1
800 - 1,499	41.9	9.6	51.5
1,500 - 2,999	56.6	14.7	71.3
3,000 - 4,999	28.8	9.7	38.5
5,000 - 6,999	28.8	0	28.8
7,000 and over	90.4	0	90.4
Total	748.0	50.6	798.6

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

[2/] Net volume, International 1/4-inch rule.

Table 4.--*Area of commercial and operable noncommercial*[1/] *forest land, by stand-size and stand volume classes, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand acres)

Stand volume class (net cubic feet per acre)	Stand-size class				
	Nonstocked	Seedling-sapling	Poletimber	Sawtimber	Total
0 - 299	19.5	241.1	10.6	0	271.2
300 - 799	0	115.8	101.5	9.6	226.9
800 - 1,499	0	4.7	118.4	30.1	153.2
1,500 - 2,199	0	5.0	42.9	37.6	85.5
2,200 and over	0	0	14.1	47.7	61.8
Total	19.5	366.6	287.5	125.0	798.6

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 5.--*Area of commercial forest land by area condition class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

Code	Area condition class	Thousand acres
10	Areas 100 percent or more stocked with desirable trees and not overstocked	21.1
20	Areas 100 percent or more stocked with desirable trees and overstocked	61.8
30	Areas 60 to 100 percent stocked with desirable trees, and with less than 30 percent of the area controlled by acceptable growing-stock trees, cull trees, inhibiting vegetation, slash, or nonstockable conditions	36.0
40	Areas 60 to 100 percent stocked with desirable trees and with 30 percent or more of the area controlled by other trees (or overstocked areas) or conditions that ordinarily prevent occupancy by desirable trees	146.0
50	Areas less than 60 percent stocked with desirable trees but with 100 percent or more stocking with growing-stock trees	138.8
60	Areas less than 60 percent stocked with desirable trees but with 60- to 100-percent stocking with growing-stock trees	245.5
70	Areas less than 60 percent stocked with desirable trees and with less than 60-percent stocking with growing-stock trees	98.8
	All classes	748.0

Table 6.--*Area of commercial forest land, by site class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

Site class[1] (cubic feet)	Thousand acres
165 or more [2]	0
120 - 165	0
85 - 120	0
50 - 85	5.0
20 - 50	743.0
Total	748.0

[1] Site class is a classification of forest land by its capability to grow crops of industrial wood based on fully stocked natural stands.

[2] Potential yield, mean annual increment.

Table 7.--*Area of commercial and noncommercial forest land, by forest type, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand acres)

Forest type	Commercial forest land	Noncommercial forest land		
		Operable[1]	Inoperable[2]	Total
Balsam poplar	14.7	0	0	0
Black Spruce	5.0	15.6	[3] 1,758.0	1,773.6
Paper birch	387.0	16.0	4.7	20.7
Quaking aspen	158.4	0	5.6	5.6
White spruce	163.4	19.0	0	19.0
Nonstocked	19.5	--	--	--
Total	748.0	50.6	1,768.3	1,818.9

[1] Operable noncommercial forest land is defined as areas presently supporting more than 800 cubic feet of volume (gross).

[2] Inoperable noncommercial forest land is defined as areas supporting a gross volume of less than 800 cubic feet per acre.

[3] All inoperable noncommercial forest land is assumed to be black spruce.

Table 8.--*Area of commercial forest land, by stand age and stand-size classes, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand acres)

Stand age (years)	Stand-size class				
	Nonstocked	Sapling-seedling	Poletimber	Sawtimber	All classes
Nonstocked					
1 - 9	0	4.7	0	0	4.7
10 - 19	4.7	36.5	0	0	41.2
20 - 29	0	70.8	4.7	0	75.5
30 - 39	14.8	153.2	24.5	0	192.5
40 - 49	0	51.1	67.2	0	118.3
50 - 59	0	21.0	49.3	0	70.3
60 - 69	0	0	4.6	0	4.6
70 - 79	0	0	19.2	4.7	23.9
80 - 89	0	4.6	5.0	9.3	18.9
90 - 99	0	0	19.8	26.3	46.1
100 - 119	0	4.7	15.6	28.2	48.5
120 - 139	0	5.6	19.2	23.7	48.5
140 - 159	0	0	6.4	9.4	15.8
160 - 179	0	0	0	4.6	4.6
180 - 199	0	0	0	0	0
200 - 299	0	0	0	4.6	4.6
300 and over	0	0	0	0	0
Mixed ages	0	9.7	11.1	9.2	30.0
Total	19.5	361.9	246.6	120.0	748.0

Table 9.--*Area of operable noncommercial*[1/] *forest land, by stand age and stand-size class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand acres)

Stand age (years)	Stand-size class				
	Nonstocked	Sapling-seedling	Poletimber	Sawtimber	All classes
1 - 9	0	0	0	0	0
10 - 19	0	0	0	0	0
20 - 29	0	0	0	0	0
30 - 39	0	0	0	0	0
40 - 49	0	0	0	0	0
50 - 59	0	0	0	0	0
60 - 69	0	0	0	0	0
70 - 79	0	0	5.6	0	5.6
80 - 89	0	0	6.4	0	6.4
90 - 99	0	0	0	0	0
100 - 119	0	4.7	14.3	0	19.0
120 - 139	0	0	0	0	0
140 - 159	0	0	4.9	0	4.9
160 - 179	0	0	0	0	0
180 - 199	0	0	0	5.0	5.0
200 - 299	0	0	0	0	0
300 and over	0	0	0	0	0
Mixed ages	0	0	9.7	0	9.7
Total	0	4.7	40.9	5.0	50.6

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 10.--*Number of growing-stock trees on commercial forest land, by species and diameter class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand trees)

Diameter class (inches d.b.h.)	Balsam poplar	Black spruce	Paper birch	Quaking aspen	White spruce	Total
1.0-2.9	12,781.1	0	203,221.9	67,046.3	58,579.6	341,628.9
3.0-4.9	5,549.8	0	78,235.0	44,572.7	17,361.9	145,719.4
5.0-6.9	4,697.1	1,236.8	20,997.1	15,016.5	9,081.8	51,029.3
7.0-8.9	1,043.9	738.7	9,184.1	5,878.5	5,691.6	22,536.8
9.0-10.9	253.9	36.6	3,989.2	1,384.7	5,087.3	10,751.7
11.0-12.9	371.7	54.7	1,043.8	176.9	3,166.3	4,813.4
13.0-14.9	131.6	0	183.9	35.9	1,447.2	1,798.6
15.0-16.9	71.9	0	27.9	13.9	755.8	869.5
17.0-18.9	11.6	0	0	22.8	261.7	296.1
19.0-20.9	9.5	0	0	0	135.6	145.1
21.0-28.9	0	0	0	0	35.0	35.0
29.0+	0	0	0	0	0	0
All classes	24,922.1	2,066.8	316,882.9	134,148.2	101,603.8	579,623.8

Table 11.--*Number of growing-stock trees 5.0-inch d.b.h. and larger on commercial and operable noncommercial[1/] forest land, by species and 5-foot height class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand trees)

5-foot height class	Balsam poplar	Black spruce	Paper birch	Quaking aspen	White spruce	All species
0 - 30	215.7	274.8	656.9	214.2	1,110.3	2,471.9
31 - 35	107.7	1,221.0	2,177.2	375.3	1,714.1	5,595.3
36 - 40	76.1	1,715.2	4,925.1	1,705.8	2,985.4	11,407.6
41 - 45	643.1	937.7	7,740.8	2,831.0	2,489.8	14,642.4
46 - 50	2,390.0	870.7	9,150.1	6,961.4	3,964.5	23,336.7
51 - 55	1,749.1	726.7	6,420.6	3,309.2	3,274.7	15,480.3
56 - 60	665.1	128.5	3,983.5	2,963.4	3,376.6	11,117.1
61 - 65	323.0	191.3	2,179.3	2,092.2	2,497.2	7,283.0
66 - 70	178.0	42.9	995.7	1,260.7	2,417.5	4,894.8
71 - 75	145.6	0	592.8	541.0	1,678.2	2,957.6
76 - 80	119.8	0	74.8	115.6	1,259.4	1,569.6
81 - 85	61.7	0	0	32.7	1,522.0	1,616.4
86 - 90	0	0	0	126.7	596.8	723.5
91 - 95	0	0	0	0	380.7	380.7
96 - 100	0	0	0	0	156.7	156.7
101+	0	0	0	0	24.2	24.2
Total	6,674.9	6,108.8	38,896.8	22,529.2	29,448.1	103,657.8

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 12.--*Net volume of timber on commercial forest land, by class of timber and softwoods and hardwoods, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Million cubic feet)

Class of timber	Softwoods	Hardwoods	Total
Sawtimber trees:			
Saw log portion	210.5	27.4	237.9
Upper stem portion	16.5	7.7	24.2
Total	227.0	35.1	262.1
Poletimber trees	67.3	248.4	315.7
All growing-stock trees	294.3	283.5	577.8
Rough trees	0	.5	.5
Rotten trees	1.2	15.3	16.5
Salvable dead trees	7.0	2.2	9.2
Total	302.5	301.5	604.0

Table 13.--*Net volume of timber on operable noncommercial*[1/] *forest land, by class of timber and softwoods and hardwoods, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Million cubic feet)

Class of timber	Softwoods	Hardwoods	Total
Sawtimber trees:			
Saw log portion	12.8	1.0	13.8
Upper stem portion	1.4	.4	1.8
Total	14.2	1.4	15.6
Poletimber trees	23.0	11.0	34.0
All growing-stock trees	37.2	12.4	49.6
Rough trees	.3	0	.3
Rotten trees	.3	.7	1.0
Salvable dead trees	.2	0	.2
Total	38.0	13.1	51.1

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 14.--*Net volume of growing stock on commercial forest land, by species and diameter class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Million cubic feet)

Diameter class (inches at breast height)	Softwoods			Hardwoods				All species
	Black spruce	White spruce	Total	Balsam poplar	Paper birch	Quaking aspen	Total	
5.0-6.9	2.6	22.7	25.3	9.0	45.7	44.2	98.9	124.2
7.0-8.9	4.2	37.8	42.0	5.7	51.7	36.6	94.0	136.0
9.0-10.9	.3	64.4	64.7	2.7	38.7	14.1	55.5	120.2
11.0-12.9	.8	62.7	63.5	6.1	14.0	2.8	22.9	86.4
13.0-14.9	0	43.8	43.8	2.4	4.2	1.0	7.6	51.4
15.0-16.9	0	30.1	30.1	1.7	.4	.6	2.7	32.8
17.0-18.9	0	13.2	13.2	.3	0	1.1	1.4	14.6
19.0-20.9	0	8.9	8.9	.5	0	0	.5	9.4
21.0-26.9	0	2.8	2.8	0	0	0	0	2.8
27.0+	0	0	0	0	0	0	0	0
Total	7.9	286.4	294.3	28.4	154.7	100.4	283.5	577.8

Table 15.--*Net volume of growing stock on commercial and operable noncommercial*[1/] *forest land, by species and diameter class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Million cubic feet)

Diameter class (inches at breast height)	Softwoods			Hardwoods				All species
	Black spruce	White spruce	Total	Balsam poplar	Paper birch	Quaking aspen	Total	
5.0-6.9	9.2	26.3	35.5	9.0	51.0	44.2	104.2	139.7
7.0-8.9	8.9	46.0	54.9	5.7	55.9	36.6	98.2	153.1
9.0-10.9	2.0	70.8	72.8	2.7	40.1	14.1	56.9	129.7
11.0-12.9	1.2	64.6	65.8	6.1	15.1	2.7	23.9	89.7
13.0-14.9	.4	47.1	47.5	2.4	4.5	1.0	7.9	55.4
15.0-16.9	0	30.1	30.1	1.7	.5	.6	2.8	32.9
17.0-18.9	0	13.2	13.2	.4	0	1.1	1.5	14.7
19.0-20.9	0	8.9	8.9	.5	0	0	.5	9.4
21.0-26.9	0	2.8	2.8	0	0	0	0	2.8
27.0+	0	0	0	0	0	0	0	0
Total	21.7	309.8	331.5	28.5	167.1	100.3	295.9	627.4

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 16.--*Net volume of sawtimber on commercial forest land, by species and diameter class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Million board feet, International 1/4-inch rule)

Diameter class (inches at breast height)	Softwoods			Hardwoods				All species
	Black spruce	White spruce	Total	Balsam poplar	Paper birch	Quaking aspen	Total	
9.0-10.9	1.9	333.9	335.8	0	0	0	0	335.8
11.0-12.9	4.0	341.6	345.6	21.1	56.4	11.9	89.4	435.0
13.0-14.9	0	251.0	251.0	9.5	18.7	4.5	32.7	283.7
15.0-16.9	0	172.7	172.7	7.9	2.0	2.8	12.7	185.4
17.0-18.9	0	77.3	77.3	1.6	0	5.0	6.6	83.9
19.0-20.9	0	53.4	53.4	2.6	0	0	2.6	56.0
21.0-28.9	0	16.5	16.5	0	0	0	0	16.5
29.0+	0	0	0	0	0	0	0	0
Total	5.9	1,246.4	1,252.3	42.7	77.1	24.2	144.0	1,396.3

Table 17.--*Net volume of sawtimber on commercial and operable noncommercial[1/] forest land, by species and diameter class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Million board feet, International 1/4-inch rule)

Diameter class (inches at breast height)	Softwoods			Hardwoods				All species
	Black spruce	White spruce	Total	Balsam poplar	Paper birch	Quaking aspen	Total	
9.0-10.9	9.7	369.5	379.2	0	0	0	0	379.2
11.0-12.9	6.1	352.6	358.7	21.0	60.9	11.9	93.8	452.5
13.0-14.9	2.5	269.8	272.3	9.5	20.4	4.6	34.5	306.8
15.0-16.9	0	172.7	172.7	7.9	2.0	2.8	12.7	185.4
17.0-18.9	0	77.3	77.3	1.6	0	5.0	6.6	83.9
19.0-20.9	0	53.4	53.4	2.6	0	0	2.6	56.0
21.0-28.9	0	16.5	16.5	0	0	0	0	16.5
29.0+	0	0	0	0	0	0	0	0
Total	18.3	1,311.8	1,330.1	42.6	83.3	24.3	150.2	1,480.3

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 18.--*Gross volume of sawtimber on commercial forest land, by species and diameter class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Million board feet, International 1/4-inch rule)

Diameter class (inches at breast height)	Softwoods			Hardwoods				All species
	Black spruce	White spruce	Total	Balsam poplar	Paper birch	Quaking aspen	Total	
9.0-10.9	2.1	338.4	340.5	0	0	0	0	340.5
11.0-12.9	4.7	352.2	356.9	22.8	82.6	13.5	118.9	475.8
13.0-14.9	0	256.5	256.5	11.6	23.1	4.8	39.5	296.0
15.0-16.9	0	184.0	184.0	9.6	4.4	2.8	16.8	200.8
17.0-18.9	0	86.5	86.5	2.0	0	5.6	7.6	94.1
19.0-20.9	0	57.1	57.1	2.6	0	0	2.6	59.7
21.0-28.9	0	17.0	17.0	0	0	0	0	17.0
29.0+	0	0	0	0	0	0	0	0
Total	6.8	1,291.7	1,298.5	48.6	110.1	26.7	185.4	1,483.9

Table 19.--*Gross volume of sawtimber on commercial and operable noncommercial[1/] forest land, by species and diameter class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Million board feet, International 1/4-inch rule)

Diameter class (inches at breast height)	Softwoods			Hardwoods				All species
	Black spruce	White spruce	Total	Balsam poplar	Paper birch	Quaking aspen	Total	
9.0-10.9	11.4	373.9	385.3	0	0	0	0	385.3
11.0-12.9	6.8	364.0	370.8	22.8	87.9	13.5	124.2	495.0
13.0-14.9	2.5	275.4	277.9	11.6	25.1	4.8	41.5	319.4
15.0-16.9	0	184.0	184.0	9.6	4.4	2.8	16.8	200.8
17.0-18.9	0	86.5	86.5	2.0	0	5.6	7.6	94.1
19.0-20.9	0	57.1	57.1	2.6	0	0	2.6	59.7
21.0-28.9	0	17.0	17.0	0	0	0	0	17.0
29.0+	0	0	0	0	0	0	0	0
Total	20.7	1,357.9	1,378.6	48.6	117.4	26.7	192.7	1,571.3

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 20.--*Net volume of sawtimber on commercial forest land, by species and log grade, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Million board feet, International 1/4-inch rule)

Species	Log grade[1/]				
	1	2	3	4[2/]	Total
Softwoods:					
Black spruce	0	0	5.9	0	5.9
White spruce	1.3	15.3	1,157.5	72.3	1,246.4
Total	1.3	15.3	1,163.4	72.3	1,252.3
Hardwoods:					
Balsam poplar	0	6.4	31.6	4.7	42.7
Paper birch	0	6.4	42.6	28.1	77.1
Quaking aspen	0	2.2	21.0	1.0	24.2
Total	0	15.0	95.2	33.8	144.0
All species	1.3	30.3	1,258.6	106.1	1,396.3

[1/] Forest Products Laboratory. Hardwood log grades for standard lumber. USDA For. Prod. Lab. Rep. R1737, 61 p., 1959.

Northern Hemlock and Hardwood Manufacturers Association. Official grading rules for northern hardwood and softwood logs and tie cuts. Green Bay, Wis. 12 p., 1959.

[2/] Logs for local use.

Table 21.--*Net volume of sawtimber on operable noncommercial*[1/] *forest land, by species and log grade, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Million board feet, International 1/4-inch rule)

Species	Log grade[2/]				
	1	2	3	4[3/]	Total
Softwoods:					
Black spruce	0	0	9.6	2.8	12.4
White spruce	0	1.5	61.7	2.2	65.4
Total	0	1.5	71.3	5.0	77.8
Hardwoods:					
Balsam poplar	0	0	0	0	0
Paper birch	0	0	6.1	0	6.1
Quaking aspen	0	0	0	0	0
Total	0	0	6.1	0	6.1
All species	0	1.5	77.4	5.0	83.9

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

[2/] Forest Products Laboratory. Hardwood log grades for standard lumber. USDA For. Prod. Lab. Rep. R1737, 61 p., 1959.

Northern Hemlock and Hardwood Manufacturers Association. Official grading rules for northern hardwood and softwood logs and tie cuts. Green Bay, Wis. 12 p., 1959.

[3/] Logs for local use.

Table 22.--*Net volume of growing stock on commercial forest land, by forest type and stand-size class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand cubic feet)

Local forest type	Stand-size class				
	Nonstocked	Sapling-seedling	Poletimber	Sawtimber	Total
Balsam poplar	0	2,948.1	17,257.5	0	20,205.6
Paper birch	0	41,386.1	106,699.0	71,751.8	219,836.9
Quaking aspen	0	27,554.2	70,098.0	1,958.8	99,611.0
White spruce	184.6	14,008.9	73,828.2	150,079.3	238,101.0
Total	184.6	85,897.3	267,882.7	223,789.9	577,754.5

Table 23.--*Net volume of growing stock on operable noncommercial*[1/] *forest land, by forest type and stand-size class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand cubic feet)

Local forest type	Stand-size class				
	Nonstocked	Sapling-seedling	Poletimber	Sawtimber	Total
Balsam poplar	0	0	0	0	0
Black spruce	0	0	16,067.4	0	16,067.4
Paper birch	0	0	11,294.3	0	11,294.3
Quaking aspen	0	0	0	0	0
White spruce	0	3,417.9	14,633.7	4,273.8	22,325.4
Total	0	3,417.9	41,995.4	4,273.8	49,687.1

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 24.--*Net volume of sawtimber on commercial forest land, by forest type and stand-size class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand board feet, International 1/4-inch rule)

Local forest type	Stand-size class				
	Nonstocked	Sapling-seedling	Poletimber	Sawtimber	Total
Balsam poplar	0	0	53,203.4	0	53,203.4
Paper birch	0	73,622.6	132,655.2	265,022.8	471,300.6
Quaking aspen	0	7,755.8	23,165.8	5,106.0	36,027.6
White spruce	0	44,674.2	162,326.3	628,821.1	835,821.6
Total	0	126,052.6	371,350.7	898,949.9	1,396,353.2

Table 25.--*Net volume of sawtimber on operable noncommercial*[1/] *forest land, by forest type and stand-size class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand board feet, International 1/4-inch rule)

Local forest type	Stand-size class				
	Nonstocked	Sapling-seedling	Poletimber	Sawtimber	Total
Balsam poplar	0	0	0	0	0
Black spruce	0	0	18,108.8	0	18,108.8
Paper birch	0	0	11,542.0	0	11,542.0
Quaking aspen	0	0	0	0	0
White spruce	0	12,572.6	24,957.9	16,731.0	54,261.5
Total	0	12,572.6	54,608.7	16,731.0	83,912.3

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 26.--*Net annual growth of growing stock, by species and forest land class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand cubic feet)

Species	Forest land class		
	Commercial	Operable noncommercial[1/]	Total
Softwoods:			
Black spruce	264.2	352.4	616.6
White spruce	5,511.6	395.7	5,907.3
Total	5,775.8	748.1	6,523.9
Hardwoods:			
Balsam poplar	773.5	.6	774.1
Paper birch	7,425.7	465.9	7,891.6
Quaking aspen	6,538.3	0	6,538.3
Total	14,737.5	466.5	15,204.0
All species	20,513.3	1,214.6	21,727.9

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 27.--*Net annual growth of sawtimber, by species and forest land class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand board feet, International 1/4-inch rule)

Species	Forest land class		
	Commercial	Operable noncommercial[1/]	Total
Softwoods:			
Black spruce	74.0	2,251.6	2,325.6
White spruce	44,027.2	2,766.7	46,793.9
Total	44,101.2	5,018.3	49,119.5
Hardwoods:			
Balsam poplar	821.8	0	821.8
Paper birch	5,252.8	146.9	5,399.7
Quaking aspen	4,512.0	0	4,512.0
Total	10,586.6	146.9	10,733.5
All species	54,687.8	5,165.2	59,853.0

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 28.--*Annual mortality of growing stock, by species and forest land class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand cubic feet)

Species	Forest land class		
	Commercial	Operable noncommercial[1/]	Total
Softwoods:			
White spruce	1,615.3	0	1,615.3
Total	1,615.3	0	1,615.3
Hardwoods:			
Balsam poplar	164.4	0	164.4
Paper birch	637.1	0	637.1
Quaking aspen	0	0	0
Total	801.5	0	801.5
All species	2,416.8	0	2,416.8

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 29.--*Annual mortality of sawtimber, by species and forest land class, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand board feet, International 1/4-inch rule)

Species	Forest land class		
	Commercial	Operable noncommercial[1/]	Total
Softwoods:			
White spruce	7,609.9	0	7,609.9
Total	7,609.9	0	7,609.9
Hardwoods:			
Balsam poplar	0	0	0
Paper birch	166.9	0	166.9
Quaking aspen	0	0	0
Total	166.9	0	166.9
All species	7,776.8	0	7,776.8

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 30.--*Annual mortality of growing stock, by cause, forest land class, and softwoods and hardwoods, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand cubic feet)

Cause	Commercial forest land			Operable noncommercial[1/] forest land		
	Softwoods	Hardwoods	Total	Softwoods	Hardwoods	Total
Fire	898.1	481.4	1,379.5	0	0	0
Insects	79.7	59.5	139.2	0	0	0
Disease	99.8	0	99.8	0	0	0
Windthrow	105.7	54.7	160.4	0	0	0
Other	432.0	179.7	611.7	0	0	0
Unknown	0	26.2	26.2	0	0	0
Total	1,615.3	801.5	2,416.8	0	0	0

[1/] Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

Table 31.--*Annual mortality of sawtimber by cause, forest land class, and softwoods and hardwoods, Fairbanks block, Tanana inventory unit, Alaska, 1970*

(Thousand board feet, International 1/4-inch rule)

Cause	Commercial forest land			Operable noncommercial 1/ forest land		
	Softwoods	Hardwoods	Total	Softwoods	Hardwoods	Total
Fire	4,538.0	166.9	4,704.9	0	0	0
Insects	421.4	0	421.4	0	0	0
Disease	580.9	0	580.9	0	0	0
Windthrow	621.6	0	621.6	0	0	0
Other	1,448.0	0	1,448.0	0	0	0
Unknown	0	0	0	0	0	0
Total	7,609.9	166.9	7,776.8	0	0	0

1/ Operable noncommercial forest land is defined as areas supporting a gross volume of more than 800 cubic feet per acre.

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Hegg, Karl M.

1975. Timber resource statistics for the Fairbanks block, Tanana inventory unit, Alaska, 1970. USDA For. Serv. Resour. Bull. PNW-59, 36 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

This resource bulletin reports on the findings of the first intensive forest inventory of a 3-million-acre unit near Fairbanks, Alaska. Included are comments on forest condition, defect, regeneration, fire history, and present use. Standard Forest Survey data are presented for commercial forest land and a special noncommercial forest land class.

Keywords: Forest surveys (Tanana Valley, Alaska).

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The mission of the PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION is to provide the knowledge, technology, and alternatives for present and future protection, management, and use of forest, range, and related environments.

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1. Providing safe and efficient technology for inventory, protection, and use of resources.
2. Development and evaluation of alternative methods and levels of resource management.
3. Achievement of optimum sustained resource productivity consistent with maintaining a high quality forest environment.

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1975
USDA FOREST SERVICE RESOURCE BULLETIN PNW-60

Two Projections of Timber Supply in the Pacific Coast States

Donald R. Gedney
Daniel D. Oswald
Roger D. Fight

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
PORTLAND, OREGON

TWO PROJECTIONS OF TIMBER SUPPLY IN THE PACIFIC COAST STATES

Reference Abstract

Gedney, Donald R., Daniel D. Oswald, and Roger D. Fight

1975. Two projections of timber supply in the Pacific Coast States. USDA For. Serv. Resour. Bull. PNW-60, 40 p., illus.

Two projections of softwood timber supply for 1970-2020 for California, western Oregon, eastern Oregon, western Washington, eastern Washington, and coastal Alaska are presented. One projection shows how much timber will likely be available in the future if forest management continues at recent levels. The second projection shows the impact of one program of intensified management on future timber supplies for these States except coastal Alaska.

KEYWORDS: Resources (forest), timber management planning, supply/demand (forest products).

Research Summary
RESOURCE BULLETIN PNW-60
1975

Softwood timber supply is projected from 1970 to 2020 by individual State or an area of the State and by owner group. The first projection shows how much timber will likely be available if forest management continues at recent levels. This projection is most meaningful over the next two or three decades, and the general pattern emerging is of relatively stable harvest levels from public lands and sharply declining yields from private lands. The second projection predicts the effect on timber supply to the year 2030 from a program of intensified management—some immediate increase in harvest on public lands because of their large inventory of old-growth timber but only a minor response on private lands until 2000. This management program assumes a required rate of return and identifies qualifying management opportunities; other projections based on different assumptions would forecast different timber supply situations.

If recent management levels continue, softwood timber supply will decrease from the 1970 level of 24.9 billion board feet, International ¼-inch scale, to 20.8 billion by 2000—83 percent of the 1970 level—and continue at that level to 2020. The projected decrease for fiber is less, from 3.8 billion cubic feet in 1970 to 3.4 billion 2000—88 percent of 1970 supply.

These overall trends are not shared equally by each State. In coastal Alaska, a substantial increase is projected; in eastern Oregon and eastern Washington, there is an immediate decrease in supply, then a continuing recovery; in California, western Oregon, and western Washington, the trend is downward. In each of these areas except coastal Alaska, individual projections of supply are made for National Forests, other public, forest industry, and other private owners. For coastal Alaska, the projection is for National Forests only.

Increased intensity in forest management would increase supply over a six-decade period by 201 billion board feet, with most of the increase occurring after 2000.

The projection of supply under recent levels of management assumes that such practices as planting, fertilizing, and other cultural activities will continue in the future. For public owners, the agencies announced allowable cut was used. For private owners, past trends were projected, tempering each projection by the available inventory, the long-term capacity of the forest to renew itself, and the total timber supply and demand situation in each area.

The projection of timber supply with intensified management presents results with only those practices included that would return at least a 5-percent rate of return on the marginal costs of treatments: site preparation, development of genetically superior stock, planting, release, precommercial thinning, fertilization, stand conversion, and commercial thinning. Only a one-decade program was considered because the purpose of the analysis was to determine the impact of a short-term program and provide input for budget planning purposes; in these terms, a decade is a realistic time period.

The management intensification program would require an investment of $469 million on 6.7 million acres and would increase total harvest by 201 billion board feet over a six-decade period. However, only nominal increases would become available this century; 86 percent of the increase would occur between 2000 and 2030.

Assumptions, techniques, costs, and yields behind the projections of supply are given. Appendix tables show area, supply, inventory volume, growth, and removals for the projection period.

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Introduction

Periodically, the United States Forest Service reviews the Nation's timber supply situation to help implement or guide public and private policy, especially those land use or management decisions that affect or are affected by timber supply.

The latest national timber supply study, "The Outlook for Timber in the United States" (USDA Forest Service 1973), presents a broad overview of the timber supply situation from 1970 to 2020. Projections of supply are for major geographic regions such as the Pacific coast region which includes California, Oregon, and Washington, and coastal Alaska. This broad regional outlook, although meeting national needs, does not provide the information needed by those concerned with local timber supply situations.

For the Pacific coast region, we made projections of timber supply for individual States or, in some cases, for subareas such as western Oregon and eastern Oregon. In this report we give the local projections of timber supply in the Pacific Coast States that were made in support of the national study. Two projections of future supply on the Pacific coast are provided. The first answers the question: "How much timber is likely to be available in the future, if forest management continues at recent levels?" This projection is particularly important in the next two to three decades because most management effort will have limited effect on the timber supply in the immediate future.

However, management is not static. Trends in forest investment and legislation, such as new Forest Practices Acts, point to increased management effort. The second projection, therefore, predicts the effect of one program of intensified forest management on future timber supplies. The one presented here assumes a required return on investment that restricts some management opportunities. Projections based on different assumptions would forecast different supply situations.

The States of Washington and Oregon are also conducting studies on this subject. In Oregon, a study by the School of Forestry at Oregon State University is designed to predict the most likely future timber supply situation in many localized parts of the State. In Washington, the State's Department of Natural Resources is determining biologic opportunities for modifying supply through intensification of forest management. Both of these studies are scheduled for completion in mid-1975. This evidence of growing interest in timber supply forecasts is encouraging. A heightened awareness of problems and a wider array of solutions provided by additional studies will provide citizens of the Northwest with more choices than are possible in this study.

This report is structured in six major sections. In the first section, the historical development of softwood production by broad national regions is examined. This not only puts the Pacific Coast States into national perspective but examines what happened to other regions after initial harvesting of their old-growth timber resources—a situation presently confronting the Pacific Coast States. In the second section, the assumptions, techniques, and methodology behind the projection of supply under continuation of recent levels of management are examined so that the projection can be more fully understood. In the third section, projections of supply are presented under the assumption of a continuation of recent levels of management. In the next two sections the assumptions, methodology, and the costs and yields resulting from an intensification of forest management are shown. In the appendix, tables of commercial forest area, site classes, product output, inventory volume, and growth and removals are shown for the projection period.

Because future hardwood supplies are not critical and are generally produced elsewhere than in the Pacific Coast States, the discussion in this report deals only with softwood supply. However, projections of hardwood supply are presented in the appendix.

The projections cover the following areas and owner groups:

California	National Forests, other public, forest industry, other private
Western Washington	National Forests, other public, forest industry, other private
Western Oregon	National Forests, other public, forest industry, other private
Eastern Oregon	National Forests, other public, forest industry, other private
Eastern Washington	National Forests, other public, forest industry, other private
Alaska	National Forests only

Regional Patterns of Timber Development

The rate of liquidations of old-growth timber resources has historically been based on the demand for wood products. In the long run, however, production from a region's timberlands must be brought into balanc with the forest's biological capacity to renev itself. This is often below the liquidation rat of the old-growth resource. How thes changes have occurred can be found in pat terns of timber production for regions whic have already made the transition from old growth to young-growth forests (figs. 1 an 2). With the Pacific coast among the las major timber regions in the country sti operating on old-growth timber, these pa terns point out possible changes yet to occu

Most of the Nation's softwood timbe first came from the northern region of th United States.[1] But by 1925, production ha decreased to less than 8 percent of the total After the old growth in the North wa depleted, the South emerged as the majo softwood lumber-producing region in th country until the latter part of the 1920's.

As lumber production continued to de cline in the North, production increase

[1] Many books, (e.g., Brown (1923) and Ho (1943)) are available on the history and developme of the forest industry.

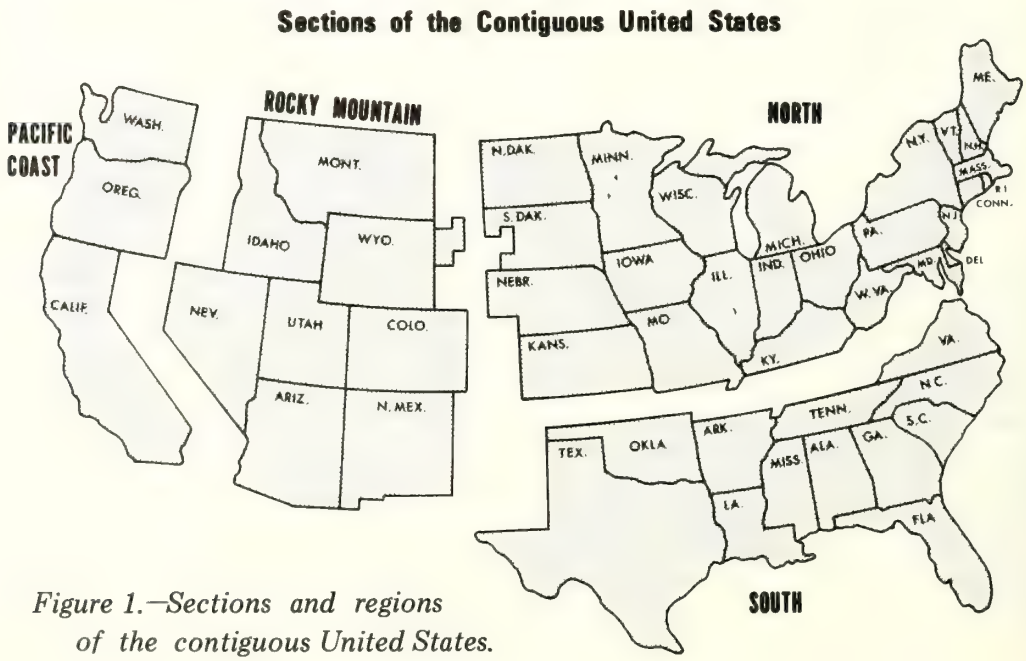

Figure 1.—Sections and regions of the contiguous United States.

rapidly on the Pacific coast where large reserves of old-growth timber were still available. Softwood production continued to climb on the Pacific coast, peaking in the 1960's after over a hundred years of continuous and almost constantly increasing production.

In every wood-producing region in this country, production from privately owned old-growth timber has been determined primarily by market demand constrained only by the limitations of the standing inventory. The "sustainable" harvest level of young-growth replacement forests was not used as a constraint on the rate of old-growth liquidation on private lands nor on public lands until recent years. Consequently, timber production declined substantially in the North and the South when the old growth was depleted.

On the Pacific coast, the private old-growth reserves, which constitute the last of such privately held reserves in the United States, are becoming scarce, a trend of declining supply marking the adjustment from old growth to young growth (Wall 1972, Oswald 1970). However, coincidental with the decrease in private supply, harvesting of old growth on public lands increased, offsetting for the time being most of the decline in the private sector. The next two to three decades of timber supply depend on private decisions on how quickly to harvest its remaining old growth and on how soon growth from maturing young-growth stands will enter the market. However, with only limited private old-growth resources available and most of the remaining old growth in public ownership, the level of supply will mainly depend on public timber harvesting policies. Eventually, supply will be determined by the level of management of both public and private lands and by how completely the capacity of the region for producing wood is realized.

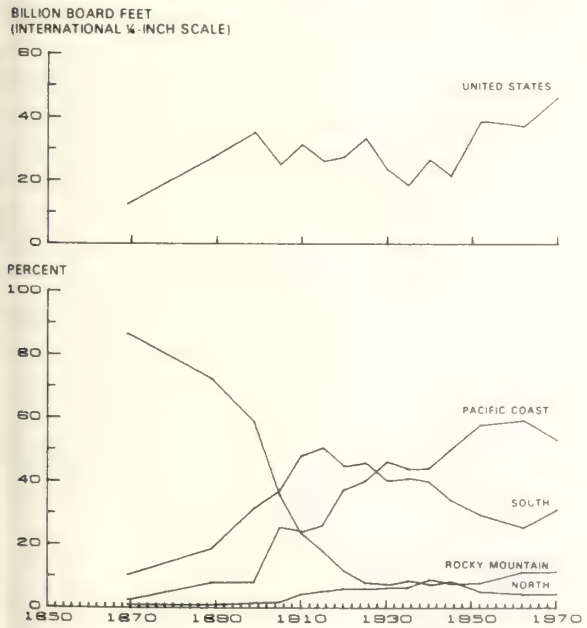

Figure 2.—Regional softwood sawtimber production in the United States, 1869-1970. Source: Production from 1869 to 1945 based on softwood lumber production as compiled by Steer (1948). After 1945, softwood sawtimber cut for all products was included, based on table 36, p. 51, of "The Outlook for Timber in the United States" (USDA Forest Service 1973).

Projection of Timber Supply Under Recent Levels of Management

The projections presented here show a level of supply that might reasonably take place under the assumption that recent levels of management will continue during the projection period. Such cultural practices as planting, thinning, fertilization, as well as protection activities, are assumed to continue at recent levels. Recent trends of timber supply will continue, changing with availability of the inventory.

These projections are especially meaningful in the next two to three decades. Most of the timber that will be cut during that period is already harvestable or almost harvest size. Measures such as planting, stand conversion, or precommercial thinning will have limited effect on immediate levels of supply, because they are most applicable to very young stands and do not result in immediate increases in material of usable size.

However, under certain circumstances, immediate increases in timber supply can be realized from these types of management practices. Increases can result if the forest manager has available reserves of merchantable timber. Having these reserves permits the forest manager to harvest the anticipated increased growth on unmerchantable size trees from the reserve of merchantable timber. Because this so-called allowable cut effect requires a substantial reserve of merchantable timber, this practice is largely limited to public owners. Therefore, on public lands, although the planned allowable cut includes benefits from future planned levels of management activities, modification of plans would have an immediate impact on present cutting levels (Schweitzer et al. 1972, Fight and Schweitzer 1974).

Other measures that directly increase supply, such as commercial thinning, are of limited importance because there are relatively few acres of timber of the right age and stocking to warrant thinning (Fight and Gedney 1973).

Owner Objectives

We projected supply separately for each owner group (National Forest, other public, forest industry, other private) and each area. For public owners, we extended over time each agency's presently calculated allowable cut.

Projections for private owners were more difficult because no one set of uniform objectives can be attributed to many individual owners. Some owners practice a very high level of forest management, and others make little conscious effort at management. However, for the projection we had to aggregate the owners into owner groups. For each owner group, we considered recent trends and current supply levels and projected these trends over time—tempering each projection by the available inventory, the long-term capacity of the resource to provide timber, and the total supply and demand situation in each area.

Our general approach was to extend and modify recent trends in supply. We first considered whether recent trends could be maintained without substantially reducing the growth capacity of the forest. If not, we modified trends so as to approach sustainable levels in the long run. The projection shows gradual rather than abrupt changes because individual owners will adjust supply levels at different times rather than all at one time. Sustainable levels of supply were continued or modified upward if resource capacity, owner objectives, and demand for raw material indicated potential for future higher levels.

Utilization Assumptions

Not all the tree volume that is harvested is used; some remains in the woods as logging residue. For this projection, we assumed that utilization of trees harvested would remain at recent levels. Logging residue averaged 6 percent of the board-foot volume in sawtimber size trees and 12 percent of the cubic-foot volume in growing-stock-size trees. Sawtimber trees are at least 11.0 inches in diameter at breast height (d.b.h.), contain at least one 12-foot log, and have a top diameter of not less than 7.0-inch outside bark. Growing-stock-size trees are at least 5.0-inch d.b.h., with a top diameter of not less than 4.0-inch outside bark.

In the projections, we increased the board-foot supply because trees smaller than 11.0 inches in diameter are increasingly being used. Board-foot supply from smaller trees was included on the following basis: the board-foot equivalent of 50 percent of the cubic-foot volume cut in trees 5- to 10.9-inch d.b.h. for 1970-80, 75 percent for 1980-90, and 88 percent thereafter.

The projections of supply not only include wood from live sound trees but also wood from dead and down trees and cull material which amounts to approximately 9 percent of the total supply over the projection period.

The Projection Model

The computer program used for the projections was developed by the Forest Service for projecting inventories to a common date and for projecting timber supplies under

varying assumptions (Larson and Goforth 1970, 1974). It was used for projections of timber supply made for the outlook study under the assumption of 1970 level of management (USDA Forest Service 1973). This program projects a stand table over time on the basis of radial growth, mortality, and ingrowth rates of trees. For the Pacific coast, these rates were based on field measurements at the time of the inventories which ranged from 1962 to 1969. Growth and mortality rates are not held constant in the program but are continually modified relative to the changing density of the forest. Increased stand density decreases growth and increases mortality within limits, and decreased stand density has the opposite effect.

The output by numbers of trees is converted to volume (cubic, International ¼-inch scale, and Scribner scale for the Pacific Coast States) by volume tables.

Area Assumptions

We assumed there would be no changes in commercial forest area[2] caused by sales or exchanges of land from one owner group to another during the projection period. Although these types of shifts were recognized for the period 1952-70, we assumed for the projection that the bulk of these changes had already occurred.[3] The projection of commercial forest land does continue the trend of losses to other uses such as roads, powerlines, rights-of-way, reservoirs, and urban development (Bolsinger 1973). The rate of loss, based on both historical trends and anticipated changes affecting the commercial forest land base, varies by area and owner.

Changes in the public sector, resulting from reclassification of commercial forest land into land reserved from timber harvesting—such as wilderness areas—were not extended. The one exception was in Alaska where one withdrawal was projected between 1970 and 1980. These types of changes, usually substantial, generally occur infrequently and were not anticipated.

Projection of Supply[4]

Softwood sawtimber supply is projected to decrease from the 1970 level of 24.9 billion board feet to 20.8 billion board feet by 2000, or 83 percent of 1970 supply, and to continue at that level thereafter to 2020 (table 1).

An increasing part of the timber supply over time will be from trees of less than 11.0-inch d.b.h. Harvest of these small trees will yield the equivalent of an additional 1.2 billion board feet by 2020—almost 6 percent of the total supply.

The projected decrease for fiber is substantially less—from the 1970 level of 3.8 billion cubic feet to 3.4 billion in 2000, 88 percent of the 1970 level of supply. By 2020, supply will increase to 3.5 billion cubic feet, 92 percent of the 1970 level.

These overall trends in timber supply are not shared equally by each State. In coastal Alaska, a substantial increase is projected, and in eastern Washington the general trend is upward. In eastern Oregon, there is an immediate drop from the 1970 level of supply but then a continuing recovery. In California, western Washington, and western Oregon the downward trend is steeper and of longer duration.

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[2] Commercial forest area is defined as forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. It must also have the capability of producing at least 20 cubic feet per acre per year.

[3] In Alaska this assumption may be unrealistic because of the Alaska Statehood Act and the Alaska Native Claims Settlement Act which can have a significant effect on the ownership of commercial forest land.

[4] Timber supply is the net utilizable roundwood volume removed from the forest and includes wood from live sound, dead, and cull trees.

Table 1.--*Supply of softwood sawtimber and softwood roundwood by State and area, 1970,*[1] *with projections*[2] *to 2020*

State and area	1970	1980	1990	2000	2010	2020
	Million board feet, International 1/4-inch scale					
Pacific coast sawtimber:						
California	5,408	5,035	4,628	4,444	4,444	4,407
Western Washington	7,365	6,719	5,853	5,417	5,218	5,104
Western Oregon	8,035	7,342	6,682	6,647	6,833	6,971
Eastern Oregon	2,120	1,843	1,855	1,863	1,879	1,899
Eastern Washington	1,230	1,198	1,252	1,290	1,318	1,344
Coastal Alaska	754	1,136	1,134	1,134	1,134	1,134
Total	24,912	23,273	21,404	20,795	20,826	20,859
	Million cubic feet					
Pacific coast roundwood:						
California	829	781	727	705	727	739
Western Washington	1,144	1,077	954	890	878	871
Western Oregon	1,166	1,113	1,014	1,050	1,112	1,164
Eastern Oregon	345	295	309	316	328	335
Eastern Washington	203	195	206	213	220	225
Coastal Alaska	119	175	175	176	177	179
Total	3,806	3,636	3,385	3,350	3,442	3,513

[1] Estimates are for trend level and consequently may differ from actual figures for the specified years.

[2] Projections were made under the assumption that forest management would continue at recent levels.

CALIFORNIA

California's timber economy has developed largely in response to local needs. Unlike other areas in the West which depend on nationwide demand, most of California's supply has been geared to its large and rapidly growing population. This, plus growth in national markets for California's wood products, has placed increasing demand on the forest resources of the State. However, since the mid-1950's, the trend in California softwood supply has been downward, indicating limitations in the capability of the resource to maintain supply at high levels. Softwood supply in California in 1970 was about 5.4 billion board feet,[5] a decrease of about 16 percent from the 1952 level of 6.5 billion board feet. Future output is projected to continue to decline and is estimated at 4.4 billion board feet in 2020, a decrease of 19 percent from the 1970 level (fig. 3). In terms

[5] Trended values are shown rather than actual point in time data.

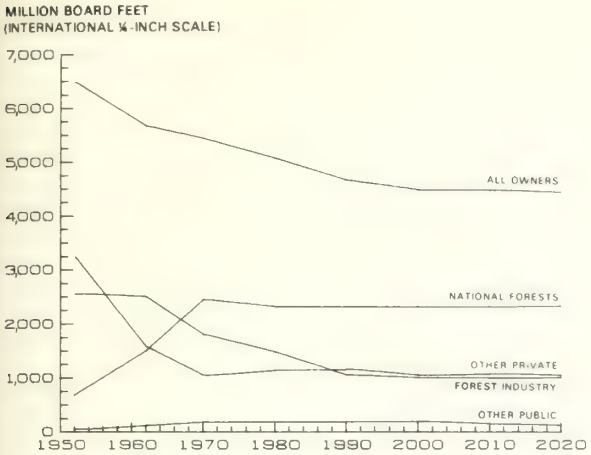

Figure 3.—Softwood sawtimber supply in California, 1952, 1962, and 1970, with projections to 2020.

of fiber, the decrease is much less, from 0.8 billion cubic feet to 0.7 billion—a decrease of 11 percent.

National Forests.—National Forests are the largest single owner in California. The 8.3 million acres of commercial forest land in National Forests is 50 percent of the total commercial forest land base, and the 162 billion board feet of softwood sawtimber is 59 percent of the total softwood sawtimber inventory in the State. National Forest lands are of generally poorer site quality[6] than those in other ownerships (appendix table 12).

Total softwood sawtimber supply from National Forests increased sharply over the last two decades. In 1952, supply was 0.7 billion board feet, about 10 percent of the State's total harvest; by 1970 it was 2.4 billion, about 45 percent of total supply in the State. Under a regulation policy of even flow, the softwood sawtimber supply has been projected at 2.3 billion board feet per year, about 50 percent of total. This includes 200 million board feet of dead and cull material and small sawtimber.

[6] Site quality expresses the relative ability of land to grow wood and is in terms of cubic-foot annual growth at culmination of mean annual growth in fully stocked natural stands.

Other public.—"Other public," consisting mainly of Bureau of Land Management (BLM) and Bureau of Indian Affairs (BIA) in the U.S. Department of the Interior, and State ownerships, represents a relatively small proportion of the total area, volume, and output in California. In 1970 the 476,000 acres of commercial forest land in these ownerships was less than 3 percent of the State's total commercial forest land; the 6.8 billion board feet of inventory volume was only 2.4 percent of the total volume; and the 172 million board feet of softwood sawtimber harvested was 3.2 percent of total supply. The land is of relatively low site quality.

Supply from these other public lands increased rapidly over the last two decades, from 26 million board feet in 1952 to 172 million in 1970. Supply is projected at the announced allowable cut level of 162 million board feet until after the turn of the century when a decrease is projected.

Total current allowable harvests for these public owners has been accepted as the projected supply through year 2000. However, this level of harvest beyond that time would result in depletion of the growing-stock base and would have a negative effect on growth. The projected supply beyond year 2000 was therefore adjusted downward. This in effect recognizes a shift to sustainable levels of harvest after removal of remaining old-growth timber, primarily on BIA and BLM lands.

Forest industry.—Forest industry land in California totals 2.7 million acres, about 16 percent of the total commercial forest area and about a third of the total commercial forest area in private ownership. The 43.4 billion board feet of softwood sawtimber inventory is 10 percent of the total sawtimber inventory in the State. Forest industry has the best site lands in the State.

Cutting on industrially owned lands has been in progress for about 100 years and has been heavy in recent decades. In 1952 the 2.5-billion-board-foot timber harvest was 39 percent of the total softwood sawtimber supply in the State. By 1970 supply dropped

to 1.8 billion board feet, about 33 percent of the total. The decline indicates that recent supply levels cannot be sustained indefinitely.

The projection of supply from industrially owned land has been made under the assumption that the present decline will continue until 1990 and then remain level. Higher levels would deplete the inventory to a point where present growth could not be maintained. Accordingly, the projected supply has been gradually reduced to about 1 billion board feet in 1990, with minor changes thereafter. This is about 58 percent of the 1970 level.

Instead of the gradual decrease assumed here, industry could maintain present supply in response to market demand or to protect industrial capacity. However, an extension of the present level of cutting would result in a depleted inventory and a precipitous decline in supply in the next two or three decades.

Other private.—The "other private" ownership is the largest owner group in the State with the exception of National Forests. In 1970 the 5.3 million acres in this group consisted of an estimated 1.5 million acres in farm ownership and 3.8 million acres in miscellaneous private ownership. The miscellaneous private owners consist of diverse groups and individuals ranging from a very substantial ownership to acreages held by recreationists, estates, and many others with a wide range of ownership objectives.

The forest land in this ownership group has lower site quality than industrially owned land but is of better site quality than public lands.

A long history of heavy cutting has reduced the old-growth softwood sawtimber inventory on some of these lands; in 1970, although the area was 32 percent of the total land base, it contained only 59.9 billion board feet or 22 percent of the total sawtimber volume.

Other private lands have produced much of California's early timber. After World War II, the demand for lumber rose sharply, and much of this demand was met by small mills cutting timber from other private lands. In 1952 timber cut from these ownerships totaled 3.2 billion board feet, almost 50 percent of the total output in the State. By 1970 the acreage in this ownership had dropped by almost 10 percent as these highly accessible lands were lost to urban development, recreation, and agricultural development, or were purchased by forest industry. The high level of supply and land loss reduced the inventory substantially, and in 1970, the inventory was only one-third of what it had been 18 years earlier. By 1970 the annual supply had dropped to 1.0 billion board feet, 19 percent of the State's total.

In projecting timber supplies from the other private ownerships, we assumed that the inventory would not be further depleted; we continued the approximate balance between growth and supply, a balance approached in 1970.

Uncertainty exists about the projected levels of supply from the other private ownership group. Any sustained increase is unlikely because of reduced inventories. In addition, the owners of many of these lands have objectives other than timber management which may limit availability of timber for harvesting. Although these lands could benefit substantially from intensified management, the level of future supply will be determined by owners' willingness to make the long-term investments needed to restore production.

THE DOUGLAS-FIR REGION OF OREGON AND WASHINGTON

Although timber supplies from western Oregon and western Washington (the Douglas-fir region) will be discussed separately, supply from these areas is closely interrelated and interdependent. Both areas supply national demand, and both areas with relatively small populations consume little of their total output. Many of the principal industrial owners have extensive holdings and mills in both States. Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and true firs (*Abies* spp.) are the dominant softwood species in both States. Together, the two States have generally maintained increasing supply over time with in-

creases from one State offsetting declines in the other.

The Douglas-fir region is the most highly productive forest region in the country, and it supplies tremendous quantities of wood for both national and international markets. In 1970 the region produced about one-fourth of the Nation's entire roundwood supply and about 32 percent of the total sawtimber supply.

Timber harvesting first centered in western Washington because of easy accessibility to water transportation, mainly along the coast and in the Puget Sound area. Subsequently, production centers shifted southward, first into southwestern Washington and then into Oregon.

Until the early 1940's supply in western Washington exceeded western Oregon; but thereafter supply in western Oregon was greater, with a peak reached in about 1952 of 68 percent of the total volume harvested in the Douglas-fir region. Since then, the differences have diminished, and by 1970, supply in western Washington had increased to 48 percent of total supply in the Douglas-fir region.

Western Washington

Timber harvesting in western Washington increased rapidly in recent years (fig. 4). In

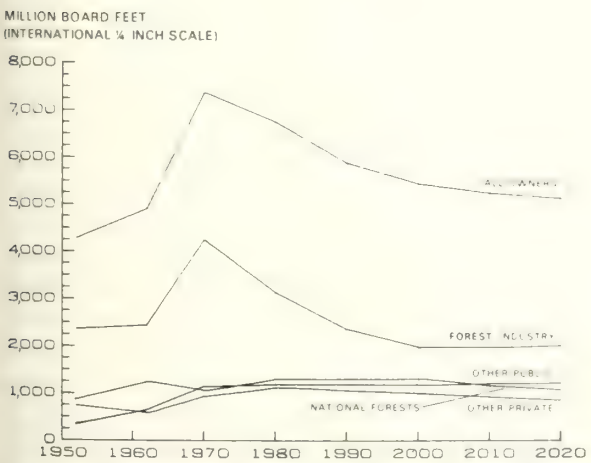

Figure 4.—Softwood sawtimber supply in western Washington, 1952, 1962, and 1970, with projections to 2020.

1970 supply was 7.4 billion board feet, an increase of 2.5 billion board feet over the 1962 level of 4.9 billion. This was in contrast to the increase of 625 million board feet between 1952 and 1962.

Most of this increase was attributable to an intensified demand for export logs. In 1970, western Washington harvested 7.4 billion board feet, of which about 2 billion was exported (Holt 1974); the high prices paid for logs stimulated production from the price-responsive sectors of the timber economy. From 1962 to 1970, the other public sector harvest increased 77 percent, or about 500 million board feet; forest industry increased 73 percent or 1.8 billion board feet; and other private output increased 66 percent, about 373 million board feet. Only National Forests did not participate in this increase; supply actually dropped.

National Forests.—National Forests in western Washington, with 2.3 million acres or 23 percent of the total commercial forest area, represent the second largest owner category in the State. These lands contain 95.3 billion board feet of softwood sawtimber, 41 percent of the total inventory with much of the volume in old-growth timber. Commercial forest land in National Forests has the poorest site quality of any ownership category in western Washington.

Supply from National Forests increased from 0.9 billion board feet in 1952 to 1.2 billion in 1962, then decreased to 1.0 billion in 1970. In 1962 National Forests produced 25 percent of total softwood supply, but the sharp rise by all the other owners in 1970 reduced its proportion to 14 percent of the total. Supply is projected to remain level until after the turn of the century and then to decrease somewhat, mainly because of decreased harvesting in the Shelton Sustained Yield Unit.

Other public.—Other public lands in western Washington consist mainly of land in State ownership with lesser amounts in BIA, county, and municipal ownerships. They represent combined holdings of 1.8 million acres, 18 percent of the total commercial

forest land area. The other public ownership includes some of the more productive land in the State. The 43.1 billion board feet in this ownership is 18 percent of total softwood sawtimber volume in western Washington.

Softwood supply from other public lands increased sharply between 1952 and 1970, from 338 million board feet to 1,150 million, an increase of 240 percent. This rapid increase is due to many administrative and management decisions reflecting different methods of calculation of allowable cut as well as intensified forest management. The projected allowable cut is assumed to remain at this level.

Other public lands will assume a more important role in supplying softwood timber to meet future needs. In 1970 its harvest of 1.2 billion board feet was 16 percent of the total supply from all commercial forest land; by 2020, the projected 1.2 billion board feet from the other public sector will be 24 percent of the total supply in western Washington.

The forests on the other public lands produce a higher level of growth than any other owner group in western Washington (appendix table 11). A principal factor in this high level of growth is the low proportion of lands in a nonproductive condition (Fight and Gedney 1973). Only 18 percent of the coniferous forest land base either is in hardwood stands or is less than 10 percent stocked. In addition, 75 percent of the total commercial forest land area is in rapidly growing young age classes, with only a relatively small area in slower growing old-growth stands. Removal and growth are currently in balance, and the level of softwood cut is projected to remain in balance with net growth to 2020.

Forest industry.—Wood from industrially owned forest land in western Washington provided 58 percent of the total harvest from all ownerships in 1970; this came from 3.6 million acres—about 36 percent of the total area in commercial forest land. The 1970 softwood sawtimber inventory was 74.8 billion board feet, about 32 percent of the total softwood sawtimber volume in all ownerships. Industrially owned forest land has highest site quality in the State.

Sawtimber supply, which was 2.4 billion board feet in 1952 and 1962, rose sharply to 4.2 billion board feet in 1970. The industrial owners of western Washington are still producing primarily from inventories of old-growth timber, and this gives them considerable flexibility to respond to market demand. However, they are rapidly approaching the time of transition from old-growth timber to supply based on the capacity and condition of young timber resources.

Recognizing that individual owners will run out of old growth at different times because of different situations, we projected a gradual decline in harvesting over a 30-year period. A 54-percent decline in supply—to 2 billion board feet—is projected by 2000. For total fiber, the projected decrease in roundwood output is 49 percent.

The transition could, of course, be different. Increasing production from some owners could offset—or more than offset—declining production from others, resulting in maintenance of or an increase in output from all owners. But this could be maintained for only a few years, and an abrupt decline would eventually follow. Continued strong markets for wood products reflected in high prices could result in this type of profile.

Although forest industry has greatly intensified forest management effort in recent years, there are still areas that are not being fully utilized for timber production. Of the commercial forest area in industrial ownership that is capable of growing softwoods, 16 percent is in hardwood stands; another 7 percent is in stands less than 10 percent stocked with either softwoods or hardwoods. Although at present 53 percent of forest industry lands are in young-growth stands under 100 years of age, 21 percent are only 10-39 percent stocked.

Other private.—The other private ownership in western Washington totals 2.3 million acres—about 23 percent of the total commercial forest land. Eighty-one percent, 1.8 million acres, is in miscellaneous private own-

ership and the rest is in farms. The miscellaneous private ownership is widely diverse, including companies primarily geared to timber production as well as many small individual owners with a wide range of ownership objectives. Much of this ownership is at lower elevations and occurs on less fertile sites than most other ownerships. Despite the substantial area in this ownership, these lands contain only 9 percent of the total softwood sawtimber inventory.

Production from these lands is relatively low. In 1970, 936 million board feet were harvested, about 13 percent of the total supply from all owners. Other private harvest is projected to increase to 1.1 billion by 1980 and thereafter gradually decrease to about 824 million board feet in 2020. Much of the projected reduction in supply is the result of expected loss of commercial forest land to other uses—mainly urban development and roads, with the area base declining 30 percent by 2020.

Many of these lands suited to growing softwoods are stocked with hardwoods, and many are carrying less than adequate softwood stocking. Of the area capable of growing conifers, 40 percent is occupied by hardwood stands or is less than 10 percent stocked, and 40 percent of the young conifer stands under 100 years of age is only 10-39 percent stocked. However, some of the less attractive features from the viewpoint of timber production, such as presence of hardwoods or poor stocking, may be attractive to owners. Because some owners have objectives other than timber production, not all these lands can be considered as available for commercial timber production and much of the area will not be available for intensified forest management.

Western Oregon

Timber harvesting in western Oregon lagged behind western Washington until the early 1940's. By 1952, softwood sawtimber supply in western Oregon was 9.3 billion board feet, 68 percent of total supply in the Douglas-fir region. This level was critical to the maintenance of the output from the Douglas-fir region as harvesting activities in western Washington decreased to relatively low levels. Within western Oregon, supply of timber was the result of the interaction between public and private ownerships. In 1952, private supply was 76 percent of total output. By 1970, private output had decreased to 54 percent of the total.

Supply in western Oregon trended downward to 1970 mostly in the private sector (fig. 5). The harvest from private ownership decreased 2.6 billion board feet, more than offsetting increases of 1.4 billion board feet from public ownerships. Total softwood sawtimber supply in western Oregon is projected to decrease 17 percent from 8.0 billion in 1970 to a low of 6.6 billion board feet by 2000. However, in terms of fiber, the decrease is only 10 percent from 1.2 billion cubic feet to 1.1 billion.

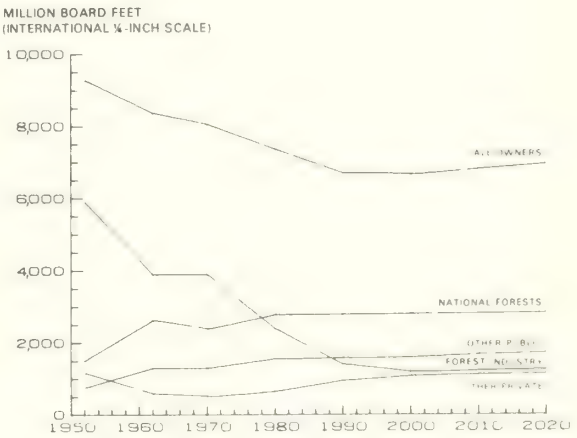

Figure 5.—Softwood sawtimber supply in western Oregon, 1952, 1962, and 1970, with projections to 2020.

National Forests.—National Forests are the largest owner group in western Oregon. Their 4.8 million acres of commercial forest land is 33 percent of the total; they also contain 172.3 billion board feet, slightly more than half the total softwood sawtimber volume. National Forest lands have the lowest site quality of any owner in western Oregon.

Timber harvesting on National Forests rose sharply between 1952 and 1962, increasing from 1.5 billion board feet to 2.6 billion, or 74 percent. At the same time, its importance in western Oregon rose from 16 percent of the total supply in 1952 to 31 percent in 1962. In 1970, timber harvest from National Forests dropped to 2.4 billion board feet, although it maintained the same relative importance as in 1962.

Timber supply in the future is projected at 2.8 billion board feet which is the present allowable cut level plus approximately 350 million board feet of additional volume in dead, cull, and small trees. With the total cut expected to decrease in western Oregon, the level of cut projected for National Forests will become an increasingly important part of the total harvest; and by 2000, the National Forest timber harvest will be 42 percent of the total from all owners.

Other public.—The other public ownership in western Oregon is mainly in land managed by the Bureau of Land Management. Of the total 2.9 million acres in this ownership 70 percent is BLM, with most of the remaining area State owned. This is the smallest owner group with an area of only 20 percent of the total and a softwood sawtimber inventory of 67.1 billion board feet, 20 percent of the total inventory in western Oregon. The lands in this ownership are of high site quality.

The harvest of softwood sawtimber increased from 749 million to 1,300 million board feet between 1952 and 1962, an increase of 74 percent. Log production in 1970 stayed at about the 1962 level but is projected to increase to 1.7 billion board feet in 2020. The other public ownership has become increasingly important as private cut declines. In 1952 other public owners accounted for only 8 percent of the total timber harvest; by 1970, the proportion had increased to 16 percent and is projected to increase to 25 percent by 2020.

The increasing cut from other public ownerships in western Oregon is due to many factors, principally the high intensity of forest management practices incorporated into the allowable cut calculation. However, unlike some situations where recognition of a high level of management precludes further increases in the allowable cut, the projected removal-growth ratio shows an excess of growth over removals. One major factor is that large areas, such as the former Tillamook Burn which is in State ownership, contribute substantial cubic-foot growth on material not yet at harvestable size. In the future this volume may increase supply levels substantially.

Forest industry.—Industrially owned forest land in western Oregon is 52 percent of total private ownership and 25 percent of total commercial forest land. Unlike many other ownerships whose land base has gradually diminished over time to other land uses or to other ownerships, industrial ownership has been increasing through acquisition of forest land from other private owners. In 1952 the area in this ownership was 3.1 million acres; by 1970 it totaled 3.6 million acres, a 16-percent increase. Industrially owned lands contain the largest proportion of high site land in western Oregon.

The rapid development of the timber industry in western Oregon has been sustained largely by raw material from forest lands owned by industry. In 1952, although industry lands were only 21 percent of the total commercial land, these lands supplied 5.9 billion board feet or 64 percent of the total timber harvest in western Oregon. In 1970 the harvest decreased to 3.9 billion board feet, but this was still 48 percent of the supply from all owners. As a result of the continuing high levels of supply, softwood sawtimber inventory from this ownership declined 42 percent between 1952 and 1970. A continuation of the declining trend starting in the early 1950's is projected for the future with the harvest on industry-owned lands down to about 1.2 billion board feet in 2000, about 30 percent of the 1970 timber harvest. After 2000, supply is projected to turn upward.

Much of the past timber cutting, especially in the dry sites in southwestern Oregon or on the coast where competition with brush hinders stand establishment, has resulted in

stands not now in a highly productive condition. Approximately 12 percent of the area capable of supporting coniferous growth has reverted to hardwood stands, and an additional 21 percent is less than 10 percent stocked. On young coniferous stands, one-third is poorly stocked having 10-39-percent stocking.

Other private.—Although other private ownerships in western Oregon had 22 percent of the total commercial forest land area, they supplied only 6 percent of the total timber harvest in 1970. They have a low inventory volume containing only 8 percent of the softwood sawtimber inventory in western Oregon. The commercial forest lands in other private ownerships have a higher site capacity than National Forests but not as good as either industry-owned or other public lands.

Timber supply from these private lands has steadily decreased from 1.1 billion board feet in 1952 to 482 million in 1970. More than half—55 percent—of the lands in these ownerships that once supported coniferous forests are now occupied by hardwood stands or are nonstocked. Of the young-growth forests, about 50 percent are poorly stocked (10-39 percent).

Removals in 1970 were less than growth. Much of the softwood sawtimber in this ownership is costly to harvest because trees are scattered in stands with low volumes per acre. Some owners of this timber have objectives other than timber production. The projection continued the trend of removals being less than growth. But we do anticipate that, with buildup of inventories, more timber will become economical in the future and timber harvest will be closer to balancing growth.

PONDEROSA PINE REGION OF OREGON AND WASHINGTON

The areas of Oregon and Washington east of the Cascade Range of mountains (ponderosa pine region) have developed largely independently of each other and the Douglas-fir region in growth of forest industries. Except in recent years, most of the timber operating companies within each area were independent of mills in the other State. Each operated within its own supply area; mobility of industrial development was not nearly as evident here as in the Douglas-fir region. The wider swings in production both within and between States that characterized development west of the mountains did not occur in the ponderosa pine region because of the larger proportion of public ownership of timber.

The ponderosa pine region lying in the rain shadow of the Cascade Range has more arid growing conditions and produces much less timber for national consumption than does the Douglas-fir region. In 1970 the region produced about 7 percent of the national supply of softwood sawtimber. The population is limited because of the relatively harsh environment, so most of the timber is for national markets, mainly in the Midwest.

Each State area in the ponderosa pine region has developed somewhat differently from the other. The earlier development of the timber industries in eastern Oregon resulted from more accessible ponderosa pine. In time the industry expanded to areas of more difficult accessibility and to acceptance of other species. Although development in eastern Washington lagged substantially behind eastern Oregon, continued growth marked the development of both areas.

Future production by owner group in the ponderosa pine region, once the residual stands of old growth are gone, will largely reflect intensity of management practiced. Unlike the Douglas-fir region where a wide range of site classes exists, most lands in the ponderosa pine region have only limited differences in site. In both States, more than half the area in any ownership is classed as capable of yielding from 50 to 85 cubic feet per acre per year.

Eastern Oregon

The softwood sawtimber harvest in eastern Oregon rose steadily between 1952 and 1970, paced by increasing output from National Forests (fig. 6). In 1952 it was almost 1.4 billion board feet; and by 1970 it reached 2.1 billion board feet, an increase of

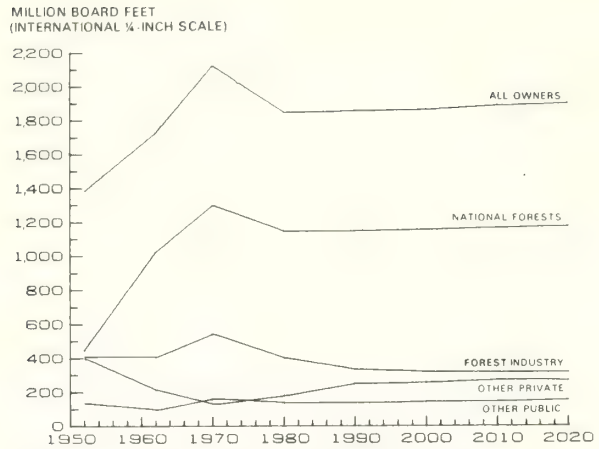

Figure 6.—Softwood sawtimber supply in eastern Oregon, 1952, 1962, and 1970, with projections to 2020.

54 percent. Projection of timber harvest for 1980-2020 is about 1.9 billion board feet—a little less than in 1970.

Much of the increase in supply has been made possible by increased use of species other than ponderosa pine (*Pinus ponderosa* Laws.). In 1925 ponderosa pine accounted for 96 percent of eastern Oregon's total timber harvest; in 1968 the proportion was 72 percent. With increasing demand for most species and easier access to timber, the supply of timber available to industry has increased.

About 70 percent of the commercial forest area in eastern Oregon is in public ownership; and more important in the short-term outlook, 83 percent of the softwood sawtimber volume is in public ownership. The timber supply in the immediate future will largely depend on the policies and objectives of the public agencies managing the timber resources.

Land ownership patterns in eastern Oregon changed rapidly between 1952 and 1962 as the result of the dissolution of the Klamath Indian Reservation. Former reservation land became part of the National Forest System; it also increased the other private and industry sectors.

National Forests.—The 7.2 million acres of commercial forest land in National Forests represent 65 percent of total commercial forest land in eastern Oregon. This very substantial ownership indicates that over the long haul, the level of eastern Oregon's timber production will inexorably be linked with National Forest timber harvest policies. In the immediate future, the importance of National Forests to the supply outlook for eastern Oregon is substantial because National Forests have about three-fourths of the total merchantable sawtimber volume.

National Forests have been increasing in both area and timber harvested. The inclusion of part of the former Klamath Indian Reservation into the National Forest System resulted in formation of a new National Forest. Between 1952 and 1970 the commercial forest land area on National Forests increased 453,000 acres, about 7 percent more than the National Forest commercial forest land in 1952; supply increased from 446 million board feet to 1.3 billion—a threefold increase. During this time, private timber harvesting dropped so the National Forest share of the total supply increased from 32 percent in 1952 to 61 percent in 1970. Supply from National Forests is projected to 2020 at about 1.2 billion board feet or 62 percent of the total harvest from all owners during the entire period.

Other public.—The other public ownerships consist mainly of land in reservations managed by the BIA[7] or public domain lands under administration of the BLM. The 316,000 acres managed by the BIA and the 200,000 acres under BLM management, together with the 78,000 acres in other miscellaneous public ownership (mainly State), represent about 5 percent of the total commercial forest land area. They contain 7 billion board feet of sawtimber.

Despite a decrease of almost 750,000 acres from termination of the Klamath Indian Reservation, the timber harvest in this owner group increased from 129 million in 1952 to 159 million board feet in 1970. During the

[7] Although Indian lands are included in public ownership due to the nature of their trusteeship and administration, they are privately owned by various tribes and some individuals.

entire projection period from 1970 to 2020, we assumed supply would remain at the allowable cut level of 130-150 million board feet. This is approximately 8 percent of the total harvest from all owners.

Forest industry.—Forest industry owns 1.6 million acres of commercial forest land or about 14 percent of the total commercial forest land base, but as of 1970, this land contained only 9 percent of the total sawtimber volume in eastern Oregon. In part, this lower than average volume can be explained by heavier cutting on private land than on other ownerships. In 1952 the 409 million board feet supplied from industrially owned commercial forest land made up 30 percent of the total timber harvest; by 1970 harvest had increased to 540 million board feet. Supply is projected to decrease to 309 million board feet in 2010.

Other private.—Other private commercial forest totals 1.7 million acres, about 100,000 acres more than the industrial ownership and about 15 percent of the total commercial forest area. About 72 percent of other private land is owned by farmers, and the remainder is in miscellaneous private ownership.

Easy access resulted in early heavy cutting on the other private lands. In 1952 the timber harvest from these lands was about 29 percent of the total supply of sawtimber in eastern Oregon. However, even with the additional acreage from the former Klamath Indian Reservation, the harvest from this ownership dropped from 397 million board feet in 1952 to 124 million in 1970.

This owner group has long provided substantial timber harvests from their lands, reducing inventories and availability of timber of merchantable size. Although harvests have decreased, growth has increased. In 1970, cubic-foot growth was three times the volume of wood removed for products. Inventory increases resulting from this buildup are assumed in the projection, making possible increased supply in the future. By 2000, timber harvest is projected at 254 million board feet, twice what it was in 1970.

Eastern Washington

Timber harvests in eastern Washington have been gradually increasing; between 1952 and 1970, supply increased by one-third to 1.2 billion board feet, with increases in public production of 481 million board feet offsetting decreases in private production of 170 million. Total harvest is projected to increase slightly in the future by about 114 million board feet, with the largest part coming from the other private ownership sector (fig. 7).

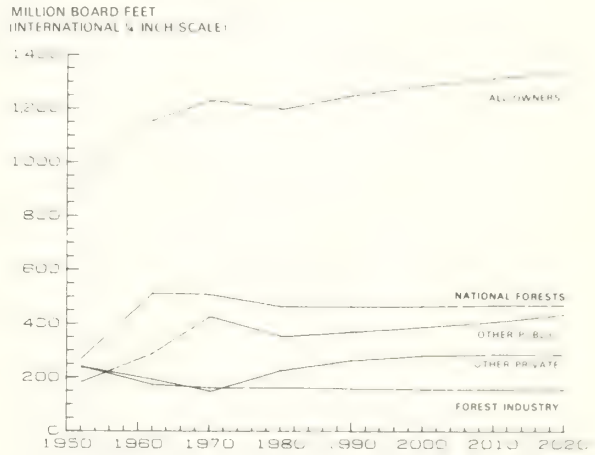

Figure 7.—Softwood sawtimber supply in eastern Washington, 1952-2020.

Public ownership in eastern Washington represents 64 percent of the total commercial forest land area. With 79 percent of the total sawtimber volume in public ownership, the direction and growth of the forest industry largely depend on programs and policies of these owners.

Private ownership in eastern Washington is dominated by land in other private ownership. Industrial ownership of forest land is relatively minor—only 25 percent of private ownership. Forest industry in eastern Washington depends on public lands and other private land for a continuing supply of timber (Bergvall and Ormrod 1974).

National Forests.—The 3.1 million acres of commercial forest land in National Forests

in eastern Washington is 37 percent of the total commercial forest land base. This land contains 51 percent of the present sawtimber inventory. Timber harvesting on National Forests has increased rapidly in recent years. In 1952 it totaled 267 million board feet, about 29 percent of total harvest. This increased by 1962 to 511 million board feet and essentially leveled in 1970 at 504 million—about 41 percent of the total supply from all owners. Supply from the National Forests is projected at about 460-470 million board feet.

Other public.—Commercial forest land in other public ownership totals 2.3 million acres, with most of it in the 1.4 million acres in Indian reservations and 0.7 million acres in State ownership; the balance is largely in other Federal ownership. Currently, the 27 percent of total commercial forest land in this owner group contains 28 percent of the total sawtimber inventory volume.

Timber harvest from these lands has steadily increased. In 1952 it was 180 million board feet or about 20 percent of the total in eastern Washington; by 1970 it was 424 million board feet or one-third of total output. However, the projected cut drops to the allowable cut level of 351 million board feet in 1980 with projected increases to 436 million board feet by 2020.

Forest industry.—Forest industry's 750,000 acres is only 9 percent of the total commercial forest land base in eastern Washington—a smaller proportion than in California, Oregon, or western Washington. The area contains 5.4 billion board feet or 7 percent of the total sawtimber inventory. The small area and volume in industrial ownership make the forest industries of eastern Washington dependent on other owners for their timber.

This dependency has increased in recent years. In 1952, industry-owned lands supplied 236 million board feet, about 26 percent of total wood harvested. By 1970 supply on industry-owned lands decreased to 157 million board feet or about 13 percent of the total harvest.

Other private.—The commercial forest area in other private ownership totals 2.3 million acres or about 27 percent of the total commercial forest land area in eastern Washington. Most of the forest land (63 percent) is owned by farmers.

Because much of this area is at lower elevations, access is easy, and there is a high proportion of ponderosa pine. These desirable features favored early logging, and by 1970, the other private ownership had only 13 percent of the total sawtimber inventory volume. This reduced timber inventory has resulted in a sharply decreased timber harvest. In 1952, these lands supplied 236 million board feet—about 26 percent of the total harvest from all owners. By 1970 the timber supply dropped to 145 million board feet and was only 12 percent of total harvest. However, since 1962, growth of both sawtimber and growing-stock trees has been either equal or in excess of removals, resulting in a buildup of inventory.

Public timber has supplanted private timber as a source of supply in this area. During 1962 to 1970, output from public lands increased rapidly. Public timber may be more desirable for many reasons; one reason is easier contractual arrangements with public agencies than with individual private owners. In addition, larger tree size, heavier volumes per acre, and concentrations of timber are more easily obtained from the old-growth stands in public ownership than from private lands stocked with young growth.

However, this is assumed to be a temporary situation, and supply is projected to increase as the inventory builds and becomes more attractive to industry. By 2000, output is projected at 283 million board feet—an increase of 95 percent over the 1970 level.

COASTAL ALASKA

The commercial forest land in coastal Alaska totals 5.6 million acres, of which 5.1 million acres is in National Forests. Most of the remaining commercial forest land is in State ownership, with a relatively small area under management of the Bureau of Land

Management, and only 30,000 acres in private ownerships. In 1970, of total removals, 91 percent came from National Forest lands.

Alaska's timber economy is just developing, so predicting the future (fig. 8) is difficult. Since most of the public ownership is in National Forests, the projection of potential supply is the announced allowable cut of the National Forests.

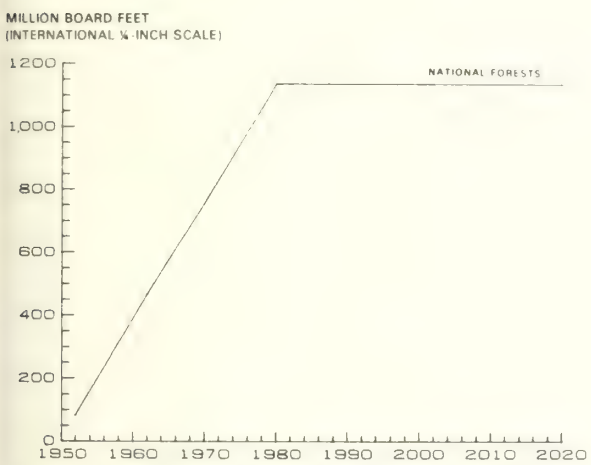

Figure 8.—Softwood sawtimber supply from National Forests in coastal Alaska, 1952, 1962, and 1970, with projections to 2020.

The 1970 harvest in coastal Alaska was 754 million board feet; the projected level is 1.1 billion board feet, about 50 percent more than in 1970.[8] This projected level does not include any timber from land currently classed as marginal commercial forest land or land presently classed as noncommercial. Both of these contain timber although logging would be uneconomical at 1970 prices. The projection reflects a decreasing commercial forest area in coastal Alaska up to about 1980 because of withdrawals for recreational purposes.

Future demand for timber from coastal Alaska depends on many factors, but principal among them is the relation of Alaska's timber resources to foreign demands and the allocation of timberland to commercial timber production. A large proportion of timber produced in Alaska is used by Japanese markets. The direction and level of exports depend on the Japanese economy as well as both State and Federal foreign trade policies.

SUMMARY

In this section we have presented estimates of future timber supplies on the Pacific coast, answering the question: "How much timber is likely to be available in the future if forest management continues at recent levels?"

The projection shows that supply of board-foot volume will decrease from the 1970 level of 24.9 billion board feet, International ¼-inch scale, to 20.8 billion by the year 2000—a decrease of 17 percent. In terms of fiber the decrease is less, from 3.8 billion cubic feet to 3.4 billion—a decrease of 12 percent. The prospect of declining timber supplies over the next two or three decades is not desirable from either the national or regional perspective. Nationally, it will mean reduced supplies of wood products from the Nation's most important sawtimber-producing region during a period of increasing demands. Regionally, it will have an adverse impact on employment and income.

These projections, especially in terms of the longer outlook, are of most value in providing a base from which to evaluate the impacts and effectiveness of programs of intensified forest management. The next section of this report presents one program of intensified management of timber resources on the Pacific coast which could change the timber supply outlook for the region.

[8] Regional Forester Yates of Region 10, USDA Forest Service, in review of this paper, stated that if the full potential of Alaska's National Forests could be cut, it could reach 1.654 billion board feet, International ¼-inch scale, by 2020.

Projection of Timber Supply With Intensified Management

There are many programs of intensified forest management that could improve future softwood timber supplies on the Pacific coast. Any program that would improve the condition of existing stands or bring nonproducing acres into production would eventually increase timber supplies to some degree. This section presents the assumptions and methodology for *one* program for intensification of forest management for Oregon, Washington, and California.[9]

This projection was shown in the outlook report (USDA Forest Service 1973, p. 123) as a case study of intensified management for Washington, Oregon, and California and, as in this report, excluded Alaska.[10] It included all owners except National Forests, but for this report National Forests are included.

Intensification of timber management can result in short-term increases in yields, if opportunities for harvest of merchantable material are available. Short-term increases can come from commercial thinnings or from increased rates of harvest in old-growth reserves in response to anticipated increases in future supplies resulting from investments, i.e., allowable cut effect. Increases in output that will be realizable only in the distant future can result from cultural operations in existing stands as well as from planting of currently unproductive acres. We are interested in both the quickly realizable and the long delayed increases in timber output in response to intensified management. As in the previous projection, only opportunities for increasing softwood timber supplies are considered. The program of intensified management presented here—as would be true with other programs—requires the expenditure of funds in programs that will result in eventually realizable increases in wood output. The program, then, is an investment program and is developed with the use of economic criteria.

ASSUMPTIONS AND METHODOLOGY

In conducting the analyses required to develop the management program, we considered the effects of a *one-decade* program of intensified management. Only those acres that were candidates for treatment during the first decade were considered. However, any acre so selected had the opportunity for continuing treatments during the entire projection period. This one-decade program was selected so that this analysis would be useful for short-term program and budgeting planning purposes; in these terms, a decade is a realistic time period.

The practices considered in the selection of acres for treatment varied by owner; in general, they included only practices considered feasible for each ownership class. Thus, the practices for National Forests are somewhat different from those for other ownerships. The practices considered were also limited to forest types for which yield data—with and without intensified management—were available.

In arriving at the amount of treatable acres, we subjected yields with and without treatment to an economic analysis to determine which combination of practices would yield dollar returns exceeding the cost of required capital investment including the interest on invested capital.

The objective of the analysis was to determine increased yields possible from programs that would be in addition to those currently underway. We assumed that the present ongoing programs would continue and that the benefits from the previous projection of supply under the assumption of continued

[9] Comparable data for Alaska were not available so Alaska was not included in the analysis. Since Alaska's allowable cut is projected to increase beyond current levels of demand, the need for this type of analysis is less than in areas where supply is already limited.

[10] The results of this projection will differ from the outlook study because some treatments were excluded from that study.

recent levels of management had already been claimed. Thus, the intensification effort represented here is in excess of that anticipated from ongoing programs. For National Forests, other public owners, and forest industry, records were used to indicate the present extend and type of management treatments. For other private owners, State programs of forest management assistance provided evidence of management treatments. In addition, for the other private owners a judgmental reduction was applied to the total acreage available for treatment. We assumed that some acreage would not be managed for timber production.

Identification of Treatable Acres

On National Forests, treatment opportunities were identified in three major forest types: Douglas-fir, fir-spruce, and ponderosa pine. The treatments considered on these types were site preparation, planting, release, and precommercial thinning. Estimates of the acres that were physically suitable for these treatments were from "project work inventories." Project work inventories are estimates of treatable acres that are prepared by field personnel based on their knowledge of local areas.

On lands other than National Forests, the estimates of treatable acres are based on a stratification of the Forest Survey inventory plots (Fight and Gedney 1973; USDA Forest Service 1973, table 48, p. 308). The treatment opportunities were evaluated for all conifer stands in western Oregon, western Washington, and for Douglas-fir stands in the north coastal area of California. Treatments were planting, converting hardwood stands to Douglas-fir, precommercial thinning, commercial thinning, fertilizing, and developing genetically superior stock for planting. In eastern Oregon, eastern Washington, and interior California only ponderosa pine and lodgepole pine were considered; treatments were precommercial and commercial thinning.

The various treatments for west-side conifer stands were included in several management regimes. Planting was evaluated as an alternative to natural regeneration or seeding on recently clearcut acres. Planting was also considered in conjunction with site preparation to convert hardwood stands occupying conifer sites. Precommercial thinning was considered on 15- and 25-year-old stands with more than 450 trees per acre. Commercial thinning was considered on 35- to 75-year-old stands with basal area stocking in growing-stock conifers in excess of 70 percent of normal. All stands currently given precommercial thinning would also be commercially thinned. Fertilization was considered for all stands qualifying for commercial thinning plus those that would be thinnable in 10 years. Fertilization was also considered as a future addition to stands currently being precommercially thinned. A program of genetic improvement was evaluated for all west-side conifer sites.

Estimates of thinnable acres of ponderosa pine and lodgepole pine were based on a stratification into stand size classes. Expert opinion was relied on to determine the thinnable acres from those classes.

Cost Assumptions

Costs of intensified management on lands other than National Forest were derived from a number of public and private sources. The assumed direct per-acre costs for 1970 were:[11]

a. Planting west-side conifers following harvest—$35
b. Site preparation and planting of nonstocked areas—$125
c. Site preparation for conversion of hardwood stands less than 45 years of age—$40
d. Precommercial thinning—$50
e. Commercial thinning—net return assumed
f. Fertilization—$22

Costs for a program of genetic improvement are for a 100,000-acre unit. The initial cost for setting up the program in the first

[11] Indirect costs were not available for other than National Forest owners. Indirect costs are highly variable and depend considerably on accounting practice.

decade is $64,000 per unit. Costs for the next four decades are $32,000 per decade. The first seedlings showing partial genetic improvement become available in the second decade and are used in the planting program for that unit thereafter. Because of the progression of regeneration cutting, the entire unit would not be planted with genetically improved stock until the second decade beyond the end of the rotation.

Costs for National Forests are based on actual costs in each region. The costs presented here and used in this analysis are the direct costs of doing the job on the ground plus local overhead costs.[12] Assumed direct plus local overhead costs per acre for 1970 are:

Practice	California National Forests	Oregon and Washington National Forests
	(Dollars)	
Site preparation and plant:		
Douglas-fir	63	64
Fir-spruce	71	74
Ponderosa pine	63	69
Release:		
Douglas-fir	14	12
Fir-spruce	17	16
Ponderosa pine	13	12
Precommercial thinning:		
Douglas-fir	31	36
Fir-spruce	35	42
Ponderosa pine	27	31

Price Assumptions

Prices for these analyses were based on 1970 National Forest timber sales. These sales are predominantly of old-growth timber and are based on Scribner log scale. The prices were adjusted to reflect sales of young growth based on International ¼-inch log scale. Thinnings were priced at 75 percent of final harvest prices. This resulted in initial prices of $23, $17, and $4 for Douglas-fir, ponderosa pine, and lodgepole pine final harvests, respectively.

As determinants of economically attractive treatments, the prices anticipated in 30 to 80 years when the increased harvests will occur are much more important than the prices assumed for the immediate future. Future prices were computed by adding regular price increases to 1970 prices. The trend in real prices[13] was projected by increasing a composite wood product price by a 1½-percent annual compound rate and attributing three-fourths of that increase to stumpage. Because stumpage prices are much less than product prices, this resulted in stumpage price increases at annual compound rates of 3½ to 5 percent over the first five decades. The anticipated final harvest prices for young growth in 2020, ignoring general inflation, are $98, $92, and $53, respectively, for Douglas-fir, ponderosa pine, and lodgepole pine.

Although these prices appear conservative when compared with trends since 1970, they were not particularly constraining in determining the potential increases in harvest that could result from more intensive management. Most practices were limited by availability of treatable acres, not the requirement that investments should earn a minimum 5-percent rate of return.

Yield Assumptions

Yield data for managed and unmanaged stands of west-side conifers were developed by Timber Management Research scientists at the Pacific Northwest Forest and Range Experiment Station. Reductions were then made to reflect expected average insect and disease impacts and unused portions of the commercial forest land base such as rock outcrops, streambeds, and natural openings.

The "full acre" yield estimates developed by Timber Management Research showed that, with stocking control, yields somewhat above Staebler (1955) gross yields, which are also "full acre" yields, could be expected. With reductions to get average yields over large areas, our estimates for full stocking control are somewhat less than Staebler gross yields on sites III and better, but somewhat

[12] Including the indirect costs of National Forest general overhead, the costs would be about double; therefore, the amount requested from Congress to implement these management practices would be about twice the amounts shown.

[13] "Real prices" are actual price levels divided by an "all commodity" price index which eliminates the price changes reflecting general inflation. The real price shows how the price of wood products has changed compared with prices of other commodities.

higher than Staebler gross yields on site IV. With full-stocking-level control and fertilization, average yields over broad areas are still less than Staebler gross yields on site II but are substantially above Staebler gross yields on sites III and IV.

Managed yields for other types were based on estimates by research silviculturists of the Pacific Northwest Forest and Range Experiment Station.

Economic Analysis

The yields, prices, and costs developed for each area, owner, and forest type were used in developing estimates of areas that would yield at least a 5-percent rate of return on the marginal costs of treatments. Tax effects on private lands were ignored, so this is a 5-percent rate of return before taxes. Although a 5-percent rate of return seems quite low by recent standards, we must recognize that we are ignoring general inflation of prices by using real prices in our price projections; it is therefore appropriate to use an interest rate that ignores inflation. The 5-percent rate resulted in most practices passing the economic screen.

The rate of return from treatments was calculated independently for each stand. Increases in yields were the changes in yields between the with-treatment and without-treatment regimes and were claimed for the years that the regimes differed. Thus, the economic evaluation did not consider any allowable cut effect.

All increments of management intensity were required to yield at least a 5-percent rate of return. Where more than one increment was considered, such as both precommercial thinning and fertilization, each increment was evaluated separately and each had to yield a minimum 5-percent return on the marginal costs of that practice.

Projection Technique

Our purpose for this projection is to identify the increases in growth and harvest that could result from the increased treatments. Increases in growth were the difference in mean annual growth between the with-treatment and the without-treatment regimes. This average over the remainder of the rotation was multiplied by the number of acres involved to estimate the growth increases for treatments. On public lands, because of the general applicability of even-flow constraints, we assumed that the allowable cut effect would result in harvest increases by the same amount and during the same period that growth increased. Eventual reductions in harvest result on other public lands because some management regimes reach rotation age before the end of the projection period and therefore quit contributing increased growth from the original investment. New opportunities in future decades and scheduling of the harvest increases would largely eliminate this irregular pattern. On private lands, where even flow is not generally a management objective, harvests were increased according to the differences in thinnings and harvests that resulted from subtracting the without-treatment regime from the with-treatment regime on a decade by decade basis. These differences were multiplied by the number of acres treated to arrive at the change in harvest resulting from the treatments. Very irregular patterns result from this procedure. These irregularities would be substantially smoothed after the first decade by considering new treatment opportunities and by scheduling the harvest to conform to management objectives.

Costs and Yields of One Program for Intensification of Timber Management

Given the previous assumptions on prices, direct costs, yields, and generally prescribed practices for various owners, many acres met the investment criteria specified for this management program in Oregon, Washington, and California.

The stand establishment practices that met the criteria included (a) planting of all

nonstocked sites (3.7 million acres); (b) use of genetically superior stock, except on low sites with long rotations; and (c) conversion of mature hardwood stands on medium sites and all hardwood stands on high sites to softwood stands (1.4 million acres).

In addition, several cultural practices applicable to existing stands met the specified criteria. These included (a) precommercial thinning followed by commercial thinning on all sites in the ponderosa pine type, and on all but the lowest site in other types (811,000 acres); (b) commercial thinning of all acres needing thinning in each area (401,000 acres); (c) fertilization of stands on high and medium sites that will be thinned and given final harvest in the next 20 years (219,000 acres—these acres are also included in b above); and (d) release of young conifer stands by herbicide application on all sites on National Forest lands (367,000 acres).

The management program outlined here involves stand establishment on 5.1 million acres and cultural treatment of existing stands on 1.6 million acres. These acres are in excess of those likely to receive treatment with recent levels of management. In total, some 6.7 million acres would receive intensified management under this alternative, at an initial cost of $468.9 million in the first decade.

Table 2 shows the distribution of these additional treatable acres by location and owner. Some significant characteristics of the distribution of these acres warrant brief discussion. Relatively few treatable acres were identified in eastern Oregon and eastern Washington. In these areas, general lack of a hardwood competition problem and widespread uneven-age management with natural regeneration in the extensive ponderosa pine forests are major reasons why the area qualifying for regeneration, release, or conversion is small. However, there are 458,000 acres, mostly in dense young stands that qualify for precommercial thinning followed by commercial thinning. The thinning opportunities occur on all ownerships.

Most of the planting opportunities in the next decade are on private lands. Of this 3.2 million acres, 2.0 million acres is from the backlog of unregenerated acres. The remainder is from the opportunities created by the harvest activities in the first decade.

Opportunities for release of conifer stands, usually through herbicide application to hardwoods that are inhibiting conifer growth, are identified only on the National Forests, primarily in western Oregon and northern California. Many acres in other ownerships probably could benefit by this treatment, but resource data needed to identify them were not available.

Almost half the acreage of hardwood conversion opportunities is in the other private owner category. The acres susceptible to this treatment, all of which are in western Oregon, western Washington, and northern California, represent areas dominated by hardwood stocking. Hardwood conversion was not identified separately from regeneration (planting) on National Forest lands.

Analysis of the increases in timber harvest that will result from the program of intensified management outlined here indicates that the $468.9 million investment in the first decade will yield 201 billion board feet of additional harvest over a six-decade period. Though the sum of the yields over the six decades is very substantial, the true impact of the program can best be understood by study of the timing of these yields (table 3, fig. 9).

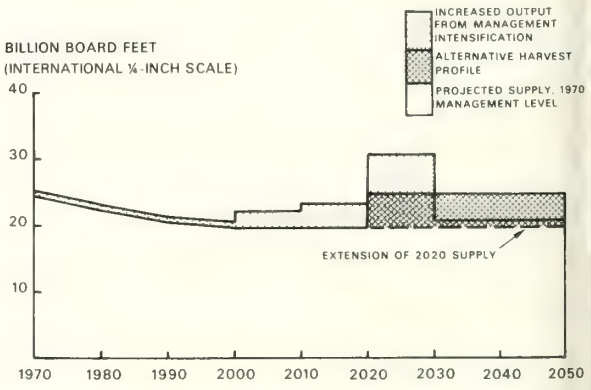

Figure 9.—Projected softwood sawtimber supply from Oregon, Washington, California, with and without intensified forest management.

Table 2.--*Area of treatment above 1970 level by management practice and owner in Oregon, Washington, and California*

(Thousand acres)

Area and owner	Planting	Thinning[1]	Hardwood conversion	Release	All practices
Western Oregon:					
National Forest	[2]83	123	--	140	346
Other public	--	100	161	--	261
Forest industry	1,107	--	190	--	1,297
Other private	791	37	329	--	1,157
Total	1,981	260	680	140	3,061
Western Washington:					
National Forest	[2]11	44	--	17	72
Other public	82	74	118	--	274
Forest industry	635	--	146	--	781
Other private	218	25	218	--	461
Total	946	143	482	17	1,588
Eastern Oregon:					
National Forest	37	104	--	14	155
Other public	--	11	--	--	11
Forest industry	--	72	--	--	72
Other private	--	55	--	--	55
Total	37	242	--	14	293
Eastern Washington:					
National Forest	20	56	--	5	81
Other public	--	32	--	--	32
Forest industry	--	39	--	--	39
Other private	--	89	--	--	89
Total	20	216	--	5	241
California:					
National Forest	[2]263	220	--	191	674
Other public	7	16	16	--	39
Forest industry	296	34	75	--	405
Other private	176	81	130	--	387
Total	742	351	221	191	1,505
All areas:					
National Forest	414	547	--	367	1,328
Other public	89	233	295	--	617
Forest industry	2,038	145	411	--	2,594
Other private	1,185	287	677	--	2,149
Total	3,726	1,212	1,383	367	6,688

[1]Includes commercial thinning and combinations of precommercial thinning, commercial thinning, and fertilization.

[2]Includes hardwood conversion.

In the first three decades, increased harvests from this program range from 930 to 975 million board feet annually, an increase of about 4.5 percent over the base-level projection of output in Oregon, Washington, and California presented in the first part of this paper.

Table 3.—Costs and responses to intensified management in Oregon, Washington, and California[1]

Area and owner	Area treated	Cost	Change in annual harvest by decade						
			First	Second	Third	Fourth	Fifth	Sixth	Seventh
	Thousand acres	*Million dollars*	*Million board feet (International 1/4-inch scale)*						
Western Oregon:									
National Forest	346	11.4	118.0	118.0	118.0	118.0	118.0	118.0	118.0
Other public	261	14.4	159.3	159.3	154.0	151.4	147.8	138.4	136.6
Forest industry	1,297	119.2	--	--	--	482.8	844.7	3,084.9	11.3
Other private	1,157	121.7	17.2	4.7	15.7	370.5	719.7	2,865.9	12.5
Total	3,061	266.7	294.5	282.0	287.7	1,122.7	1,830.2	6,207.2	278.4
Western Washington:									
National Forest	72	2.6	22.6	22.6	22.6	22.6	22.6	22.6	22.6
Other public	274	13.3	190.6	190.6	190.6	187.0	172.2	161.8	161.8
Forest industry	781	55.2	--	--	--	348.9	522.0	1,673.8	22.7
Other private	461	37.5	20.9	-9.5	-8.0	195.0	288.7	1,120.0	9.9
Total	1,588	108.6	234.1	203.7	205.2	753.5	1,005.5	2,978.2	217.0
Douglas-fir region:									
National Forest	418	14.0	140.6	140.6	140.6	140.6	140.6	140.6	140.6
Other public	535	27.7	349.9	349.9	344.6	338.4	320.0	300.2	298.4
Forest industry	2,078	174.4	--	--	--	831.7	1,366.7	4,758.7	34.0
Other private	1,618	159.2	38.1	-4.8	7.7	565.5	1,008.4	3,985.9	22.4
Total	4,649	375.3	528.6	485.7	492.9	1,876.2	2,835.7	9,185.4	495.4
Eastern Oregon:									
National Forest	155	6.2	45.7	45.7	45.7	45.7	45.7	45.7	45.7
Other public	11	0.2	2.2	2.2	2.2	2.2	1.2	1.2	1.2
Forest industry	72	2.4	7.0	11.0	5.6	10.8	-5.0	8.2	7.4
Other private	55	1.2	8.7	13.9	7.0	9.9	-11.2	5.1	5.0
Total	293	10.0	63.6	72.8	60.5	68.6	30.7	60.2	59.3
Eastern Washington:									
National Forest	81	3.3	26.6	26.6	26.6	26.6	26.6	26.6	26.6
Other public	32	0.6	6.8	6.8	6.8	6.8	3.5	3.5	3.5
Forest industry	39	1.5	2.6	4.1	2.1	6.8	2.4	7.2	7.2
Other private	89	3.6	5.3	8.4	4.3	16.1	5.8	18.6	20.2
Total	241	9.0	41.3	45.9	39.8	56.3	38.3	55.9	57.5
Ponderosa pine region:									
National Forest	236	9.5	72.3	72.3	72.3	72.3	72.3	72.3	72.3
Other public	43	0.8	9.0	9.0	9.0	9.0	4.7	4.7	4.7
Forest industry	111	3.9	9.6	15.1	7.7	17.6	-2.6	15.4	14.6
Other private	144	4.8	14.0	22.3	11.3	26.0	-5.4	23.7	25.2
Total	534	19.0	104.9	118.7	100.3	124.9	69.0	116.1	116.8
California:									
National Forest	674	25.5	294.8	294.8	294.8	294.8	294.8	294.8	294.8
Other public	39	2.8	22.8	22.8	22.7	22.5	22.2	22.2	22.2
Forest industry	405	21.0	7.3	11.4	5.8	184.4	245.2	687.5	5.9
Other private	387	25.3	16.3	25.7	13.1	127.0	180.5	703.3	7.2
Total	1,505	74.6	341.2	354.7	336.4	628.7	742.7	1,707.8	330.1
All areas:									
National Forest	1,328	49.0	507.7	507.7	507.7	507.7	507.7	507.7	507.7
Other public	617	31.3	381.7	381.7	376.3	369.9	346.9	327.1	325.3
Forest industry	2,594	199.3	16.9	26.5	13.5	1,033.7	1,609.3	5,461.6	54.5
Other private	2,149	189.3	68.4	43.2	32.1	718.5	1,183.5	4,712.9	54.8
Total	6,688	468.9	974.7	959.1	929.6	2,629.8	3,647.4	11,009.3	942.3

[1]Includes intensified management opportunities returning 5 percent or more. Investments are made only in first decade; this results in reduced response in the seventh decade.

The increased harvests in the first three decades come almost entirely from public lands. On these lands, which have reserves of old-growth timber, expected gains in growth in the future as the result of intensified management are reflected in immediate increases in the allowable harvest rate in the old-growth reserves. Consequently, all practices initiated can result in immediate increases in harvest, even though the fiber resulting from the practice might not be available for several decades. On private lands, large reserves of old growth are no longer available. Thus, yields cannot be realized substantially in advance of their availability for harvest. The only practice that provides immediate yields on private lands is commercial thinning, which accounts for virtually all of the increases in harvests on private lands in the first three decades.

In the fourth and fifth decades, the increases in harvest from intensified management total 2.6 and 3.6 billion board feet annually over the base projections for those decades, an increase of 13 to 18 percent. About 72 percent of the increased harvest from 2000 to 2020 would come from private lands, primarily from commercial thinnings on stands regenerated or precommercially thinned during the first decade of the planning period. The increase in public harvest during the 2000-2020 period would remain at about the same level as for the first three decades of the planning period.

The large payoff for the program of intensified management becomes available in the sixth decade, during which the annual harvest could increase approximately 11.0 billion board feet (or 56 percent) over an extension of the 2020 base projection level. Of this increased harvest, 92 percent would come from private lands. The large amount of volume available for harvest in the sixth decade is due to availability (for final harvest) of stands created by investments on private lands in the first decade.

The intensified management program outlined here could increase total sawtimber output by 201 billion board feet, or 16 percent, over the next six decades.

The economic analysis underlying the intensified management program outlined in this section was based on the assumption that rotation age for privately owned timber is 50 years, and that stands created in the first decade will be harvested in the sixth decade. The harvest profile from this analysis shows very high increased yields in the sixth decade, followed by a much lower level in the seventh decade.

For illustrative purposes we have also shown an alternative final harvest profile extending through the eighth decade, which could result if rotation ages were extended and final harvest spread over three decades. This alternative is not necessarily consistent with the economic guidelines used in developing the intensified management program presented in this section.

If the sixth decade final harvests were spread over three decades, the annual increase in yields could average 5 billion board feet over the three decade period (fig. 9). This type of final harvest profile would provide for more stable output, which could likely be added to and extended further into the future with added investment in intensified management beyond the first decade.

SUMMARY

This section has presented one of many possible programs of intensified management of the timberlands of Oregon, Washington, and California. Given the management intensification program outlined here, $469 million invested on 6.7 million acres in the first decade would increase total harvests by 201 billion board feet over the next six decades. However, only nominal increases—from increased allowable cuts on public lands—would become available during this century; 86 percent of the increases would occur in the fourth through sixth decades. On private lands, yields from intensified management would largely be realized as the treated stands matured. Yields from this program will do little to mitigate the supply declines projected for the next two or three decades; they will have a substantial beneficial impact on timber supplies during the period 2000-2030.

The general pattern that emerges from these projections is one of relatively stable harvest levels from public lands and sharply declining harvest from private lands. The program of intensive management that we considered would result in immediate long-term increases in harvest on public lands. Although long-term increases are projected on private lands, only a minor part of these will occur within the first 30 years of the projection.

The two factors that could have a significant effect on this pattern are the scheduling of harvest on public lands and the assumed potential growth. On public lands, an accelerated liquidation of the old-growth inventory would substantially increase harvest levels in the immediate future. Increased potential growth could result from assumptions of significantly greater response to treatments, from treatments of stands and types not currently considered, and from other treatments not now included. This would extend the range of treatments beyond those currently considered feasible.

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Appendix

TABLES 4-12

Table 4.—Supply in California by owner class and species group, 1952, 1962, and 1970,[1] with projections to 2020[2]

(In millions)

Owner class and species group	Unit	1952	1962	1970	Projections				
					1980	1990	2000	2010	2020
National Forests:									
Softwoods	Board feet	681	1,502	2,439	2,301	2,303	2,309	2,319	2,338
Hardwoods	Board feet	3	8	19	25	25	25	25	25
Softwoods	Cubic feet	88	216	346	325	328	334	344	360
Hardwoods	Cubic feet	2	3	5	6	6	7	7	7
Other public:									
Softwoods	Board feet	26	108	172	162	162	162	111	79
Hardwoods	Board feet	1	2	4	5	4	4	4	4
Softwoods	Cubic feet	3	16	26	25	26	27	20	14
Hardwoods	Cubic feet	--	1	1	2	1	1	1	1
Forest industry:									
Softwoods	Board feet	2,540	2,473	1,777	1,444	1,023	960	956	985
Hardwoods	Board feet	2	4	11	13	14	14	16	18
Softwoods	Cubic feet	393	385	294	246	179	174	177	188
Hardwoods	Cubic feet	2	3	3	3	3	4	4	4
Other private:									
Softwoods	Board feet	3,228	1,555	1,020	1,128	1,140	1,013	1,058	1,005
Hardwoods	Board feet	3	8	18	20	25	24	31	29
Softwoods	Cubic feet	468	230	163	185	194	170	186	177
Hardwoods	Cubic feet	2	4	7	5	6	6	8	8
All owners:									
Softwoods	Board feet	6,475	5,638	5,408	5,035	4,628	4,444	4,444	4,407
Hardwoods	Board feet	9	22	52	63	68	67	76	76
Softwoods	Cubic feet	952	847	829	781	727	705	727	739
Hardwoods	Cubic feet	6	11	16	16	16	18	20	20

[1]Estimates are for trend levels and consequently may differ from actual figures for the specified year.

[2]Projections were made under the assumption that forest management would continue at recent levels.

Table 5.—Supply in western Oregon by owner class and species group, 1952, 1962, and 1970,[1] with projections to 2020[2]

(In millions)

Owner class and species group	Unit	1952	1962	1970	Projections				
					1980	1990	2000	2010	2020
National Forests:									
Softwoods	Board feet	1,501	2,615	2,372	2,774	2,787	2,803	2,818	2,840
Hardwoods	Board feet	--	4	19	31	31	31	31	31
Softwoods	Cubic feet	234	401	345	411	414	418	424	432
Hardwoods	Cubic feet	--	1	4	4	4	4	4	4
Other public:									
Softwoods	Board feet	749	1,300	1,294	1,554	1,574	1,599	1,673	1,730
Hardwoods	Board feet	22	4	5	6	7	8	9	10
Softwoods	Cubic feet	109	192	179	222	227	237	257	277
Hardwoods	Cubic feet	5	1	1	1	1	1	1	2
Forest industry:									
Softwoods	Board feet	5,890	3,870	3,887	2,368	1,379	1,171	1,227	1,260
Hardwoods	Board feet	66	46	54	56	65	75	81	81
Softwoods	Cubic feet	874	583	572	368	210	207	233	252
Hardwoods	Cubic feet	16	11	12	8	11	14	16	18
Other private:									
Softwoods	Board feet	1,126	558	482	646	942	1,074	1,115	1,141
Hardwoods	Board feet	13	6	3	9	17	19	20	20
Softwoods	Cubic feet	182	97	70	112	163	188	198	203
Hardwoods	Cubic feet	4	2	1	2	3	3	3	3
All owners:									
Softwoods	Board feet	9,266	8,343	8,035	7,342	6,682	6,647	6,833	6,971
Hardwoods	Board feet	101	60	81	102	120	133	141	142
Softwoods	Cubic feet	1,399	1,273	1,166	1,113	1,014	1,050	1,112	1,164
Hardwoods	Cubic feet	25	15	18	15	19	22	24	27

[1]Estimates are for trend levels and consequently may differ from actual figures for the specified year.

[2]Projections were made under the assumption that forest management would continue at recent levels.

Table 6.—Supply in western Washington by owner class and species group, 1952, 1962, and 1970,[1] with projections to 2020[2]

(In millions)

Owner class and species group	Unit	1952	1962	1970	Projections				
					1980	1990	2000	2010	2020
National Forests:									
Softwoods	Board feet	870	1,245	1,042	1,302	1,305	1,308	1,138	1,051
Hardwoods	Board feet	--	--	--	4	4	4	4	4
Softwoods	Cubic feet	126	185	145	185	186	187	164	151
Hardwoods	Cubic feet	--	--	1	1	1	1	1	1
Other public:									
Softwoods	Board feet	338	650	1,150	1,193	1,172	1,166	1,215	1,218
Hardwoods	Board feet	--	4	30	20	20	20	20	20
Softwoods	Cubic feet	49	98	164	184	188	188	202	207
Hardwoods	Cubic feet	--	2	8	5	5	5	5	5
Forest industry:									
Softwoods	Board feet	2,366	2,446	4,237	3,109	2,342	1,964	1,962	2,011
Hardwoods	Board feet	4	34	88	114	144	166	181	182
Softwoods	Cubic feet	370	393	661	499	389	336	346	362
Hardwoods	Cubic feet	2	11	25	28	37	43	46	46
Other private:									
Softwoods	Board feet	705	563	936	1,115	1,034	979	903	824
Hardwoods	Board feet	4	77	61	72	72	72	72	73
Softwoods	Cubic feet	134	110	174	209	191	179	166	151
Hardwoods	Cubic feet	2	22	15	15	15	15	15	15
All owners:									
Softwoods	Board feet	4,279	4,904	7,365	6,719	5,853	5,417	5,218	5,104
Hardwoods	Board feet	8	115	179	210	240	262	277	279
Softwoods	Cubic feet	679	786	1,144	1,077	954	890	878	871
Hardwoods	Cubic feet	4	35	49	49	58	64	67	67

[1]Estimates are for trend levels and consequently may differ from actual figures for the specified year.

[2]Projections were made under the assumption that forest management would continue at recent levels.

Table 7.—Supply in eastern Oregon by owner class and species group, 1952, 1962, and 1970,[1] with projections to 2020[2]

(In millions)

Owner class and species group	Unit	1952	1962	1970	Projections				
					1980	1990	2000	2010	2020
National Forests:									
Softwoods	Board feet	446	1,021	1,297	1,139	1,147	1,156	1,165	1,175
Hardwoods	Board feet	--	--	--	--	--	--	--	--
Softwoods	Cubic feet	68	161	208	172	176	179	184	188
Hardwoods	Cubic feet	--	--	--	--	--	--	--	--
Other public:									
Softwoods	Board feet	129	92	159	132	135	141	145	152
Hardwoods	Board feet	--	--	--	--	--	--	--	--
Softwoods	Cubic feet	20	15	26	22	24	25	28	30
Hardwoods	Cubic feet	--	--	--	--	--	--	--	--
Forest industry:									
Softwoods	Board feet	409	403	540	395	326	312	309	312
Hardwoods	Board feet	--	--	--	--	--	--	--	--
Softwoods	Cubic feet	62	65	90	65	58	58	59	59
Hardwoods	Cubic feet	--	--	--	--	--	--	--	--
Other private:									
Softwoods	Board feet	397	208	124	177	247	254	260	260
Hardwoods	Board feet	--	--	--	--	--	--	--	--
Softwoods	Cubic feet	60	34	21	36	51	54	57	58
Hardwoods	Cubic feet	--	--	--	--	--	--	--	--
All owners:									
Softwoods	Board feet	1,381	1,724	2,120	1,843	1,855	1,863	1,879	1,899
Hardwoods	Board feet	--	--	--	--	--	--	--	--
Softwoods	Cubic feet	210	275	345	295	309	316	328	335
Hardwoods	Cubic feet	--	--	--	--	--	--	--	--

[1]Estimates are for trend levels and consequently may differ from actual figures for the specified year.

[2]Projections were made under the assumption that forest management would continue at recent levels.

Table 8.—Supply in eastern Washington by owner class and species group, 1952, 1962, and 1970,[1] with projections to 2020[2]

(In millions)

Owner class and species group	Unit	1952	1962	1970	Projections				
					1980	1990	2000	2010	2020
National Forests:									
Softwoods	Board feet	267	511	504	460	463	466	470	472
Hardwoods	Board feet	1	1	3	3	3	3	3	3
Softwoods	Cubic feet	32	71	78	69	70	71	72	73
Hardwoods	Cubic feet	--	--	1	1	1	1	1	1
Other public:									
Softwoods	Board feet	180	288	424	351	370	389	408	436
Hardwoods	Board feet	--	--	--	--	--	--	--	--
Softwoods	Cubic feet	28	46	71	57	61	65	69	74
Hardwoods	Cubic feet	--	--	--	--	--	--	--	--
Forest industry:									
Softwoods	Board feet	236	169	157	160	155	152	154	153
Hardwoods	Board feet	--	--	--	--	--	--	--	--
Softwoods	Cubic feet	38	28	27	28	28	27	28	28
Hardwoods	Cubic feet	--	--	--	--	--	--	--	--
Other private:									
Softwoods	Board feet	236	188	145	227	264	283	286	283
Hardwoods	Board feet	1	1	4	--	--	--	--	--
Softwoods	Cubic feet	40	34	27	41	47	50	51	50
Hardwoods	Cubic feet	--	--	1	--	--	--	--	--
All owners:									
Softwoods	Board feet	919	1,156	1,230	1,198	1,252	1,290	1,318	1,344
Hardwoods	Board feet	2	2	7	3	3	3	3	3
Softwoods	Cubic feet	138	179	203	195	206	213	220	225
Hardwoods	Cubic feet	--	--	2	--	1	1	1	1

[1]Estimates are for trend levels and consequently may differ from actual figures for the specified year.

[2]Projections were made under the assumption that forest management would continue at recent levels.

Table 9.--*Softwood supply from all owners in coastal Alaska, 1952, 1962, and 1970,*[1] *with projections for National Forests to 2020*[2]

(In millions)

Year	All owners		National Forests	
	Board feet	Cubic feet	Board feet	Cubic feet
1952	82	13	--	--
1962	467	74	--	--
1970	754	119	--	--
1980	--	--	1,136	175
1990	--	--	1,134	175
2000	--	--	1,134	176
2010	--	--	1,134	177
2020	--	--	1,134	179

[1]Estimates are for trend levels and consequently may differ from actual figures for the specified year.

[2]Projections were made under the assumption that forest management would continue at recent levels.

Table 10.--*Commercial forest area by region and owner, 1952-2020*

(Thousand acres)

Region and owner	1952	1962	1970	Projections				
				1980	1990	2000	2010	2020
Western Oregon:								
National Forests	4,576	4,857	4,830	4,810	4,791	4,772	4,752	4,733
Other public	3,154	2,963	2,922	2,825	2,755	2,700	2,658	2,644
Forest industry	3,128	3,548	3,624	3,516	3,439	3,378	3,331	3,316
Other private	3,743	3,379	3,259	3,168	3,103	3,050	3,011	2,998
Western Washington:								
National Forests	2,398	2,398	2,321	2,312	2,302	2,293	2,284	2,275
Other public	1,952	1,852	1,802	1,714	1,630	1,598	1,573	1,562
Forest industry	3,748	3,686	3,598	3,485	3,404	3,339	3,290	3,274
Other private	2,531	2,416	2,270	2,036	1,868	1,734	1,634	1,600
Eastern Oregon:								
National Forests	6,720	7,208	7,173	7,160	7,148	7,135	7,123	7,110
Other public	1,345	595	594	589	585	582	580	579
Forest industry	1,533	1,585	1,582	1,565	1,554	1,544	1,537	1,534
Other private	1,489	1,699	1,689	1,677	1,669	1,662	1,657	1,655
Eastern Washington:								
National Forests	3,197	3,196	3,103	3,098	3,093	3,088	3,083	3,078
Other public	2,340	2,304	2,292	2,284	2,278	2,274	2,270	2,268
Forest industry	637	652	750	749	748	747	746	746
Other private	2,386	2,356	2,265	2,221	2,190	2,165	2,147	2,140
California:								
National Forests	8,372	8,393	8,344	8,336	8,329	8,322	8,314	8,307
Other public	703	531	476	471	467	465	462	462
Forest industry	2,167	2,457	2,665	2,618	2,590	2,563	2,555	2,547
Other private	5,885	5,662	5,343	5,232	5,107	5,107	5,053	5,053
Coastal Alaska:								
National Forests[1]	5,713	5,713	5,639	5,313	5,313	5,313	5,313	5,313

[1]Includes other owners.

Table 11.—Average inventory volume

Region and owner	1970			1980			1990		
	Inventory	Growth	Removals	Inventory	Growth	Removals	Inventory	Growth	R
Western Oregon:									
National Forests	6,335	30	73	5,819	34	87	5,318	37	8
Other public	4,241	76	62	4,290	85	79	4,503	96	8
Forest industry	3,232	50	163	2,571	56	108	2,553	65	6
Other private	2,489	72	22	2,980	76	36	3,371	82	5
Western Washington:									
National Forests	6,864	28	65	6,420	31	76	6,003	34	7
Other public	5,132	125	100	5,494	130	115	5,904	133	2
Forest industry	4,257	105	200	3,674	107	159	3,480	112	3
Other private	3,007	122	89	3,362	122	128	3,622	116	2
Eastern Oregon:									
National Forests	2,466	33	22	2,590	35	23	2,730	37	2
Other public	2,680	13	45	2,477	17	39	2,291	22	4
Forest industry	1,427	34	58	1,349	38	43	1,376	42	3
Other private	1,621	38	12	1,846	39	21	1,975	38	3
Eastern Washington:									
National Forests	2,664	32	26	2,772	34	23	2,889	35	2
Other public	2,153	27	32	2,178	27	26	2,182	27	2
Forest industry	1,851	46	37	1,932	47	38	2,031	47	3
Other private	1,414	45	13	1,739	49	19	2,058	51	2
California:									
National Forests	3,621	31	45	3,530	34	42	3,472	38	4
Other public	3,120	42	61	3,002	46	60	2,902	50	6
Forest industry	3,476	53	118	3,048	63	101	2,938	67	7
Other private	2,488	40	34	2,573	42	39	2,659	44	4
Coastal Alaska:									
National Forests	6,166	5	28	5,819	8	43	5,471	11	4

[1]Includes live sound trees 5.0-inch d.b.h. and larger. Removals represent total drain on the forest including timber products, logging residue, and volume lost through conversion of commercial forest land to other uses. Projections were made under the assumption that forest management would continue at recent levels.

mals by region and owner, 1970-2020[1]

e)

2000		2010			2020		
Growth	Removals	Inventory	Growth	Removals	Inventory	Growth	Removals
40	89	4,365	43	91	3,904	46	93
105	89	4,947	113	98	5,114	120	106
74	66	2,776	79	76	2,802	80	82
83	63	3,858	81	67	3,990	80	69
37	78	5,331	40	69	5,072	43	70
135	126	6,284	137	138	6,320	138	141
119	120	3,548	125	126	3,555	129	131
112	127	3,913	110	124	4,002	109	109
39	24	3,049	41	24	3,221	42	25
25	44	1,940	28	48	1,754	31	53
46	38	1,552	46	38	1,622	45	39
38	33	2,098	38	34	2,137	38	35
36	24	3,142	37	24	3,274	37	24
27	29	2,131	27	31	2,065	26	34
48	38	2,235	48	38	2,330	47	38
51	24	2,651	50	25	2,906	47	24
40	43	3,416	42	45	3,395	44	47
53	65	2,872	53	49	3,051	53	37
68	73	2,874	69	75	2,820	70	80
44	37	2,813	45	41	2,882	46	39
17	44	4,935	25	44	4,810	38	44

Table 12.—Area of commercial forest land by ownership, site class,[1] and State, January 1, 1970

(Thousand acres)

State and owner	Site class					
	Total	165+ cu. ft.	120-165 cu. ft.	85-120 cu. ft.	50-85 cu. ft.	Less than 50 cu. ft.
Western Oregon:						
National Forest	4,830	656	1,363	1,172	1,413	226
Other public	2,922	597	1,294	515	466	50
Forest industry	3,624	1,285	1,140	648	415	136
Other private	3,259	796	1,013	629	626	195
Total	14,635	3,334	4,810	2,964	2,920	607
Western Washington:						
National Forest	2,321	390	596	517	721	97
Other public	1,802	639	636	301	187	39
Forest industry	3,598	1,450	1,198	545	386	19
Other private	2,270	426	886	496	457	5
Total	9,991	2,905	3,316	1,859	1,751	160
Eastern Oregon:						
National Forest	7,173	57	211	1,672	4,105	1,128
Other public	594	30	81	76	334	73
Forest industry	1,582	47	77	305	902	251
Other private	1,689	--	64	202	963	460
Total	11,038	134	433	2,255	6,304	1,912
Eastern Washington:						
National Forest	3,103	112	296	686	1,513	496
Other public	2,292	58	122	431	1,416	265
Forest industry	750	27	52	166	465	40
Other private	2,265	52	132	427	1,398	256
Total	8,410	249	602	1,710	4,792	1,057
California:						
National Forest	8,344	459	889	2,214	3,821	961
Other public	476	31	75	91	243	36
Forest industry	2,665	680	706	681	572	26
Other private	5,343	619	1,553	1,189	1,340	642
Total	16,828	1,789	3,223	4,175	5,976	1,665
Coastal Alaska:						
National Forest	5,144	131	1,535	2,440	945	93
Other public	465	12	65	155	210	23
Other private	30	1	8	14	6	1
Total	5,639	144	1,608	2,609	1,161	117

[1]A classification in terms of capacity for cubic-foot annual growth per acre at culmination of mean annual growth.

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Gedney, Donald R., Daniel D. Oswald, and Roger D. Fight

1975. Two projections of timber supply in the Pacific Coast States. USDA For. Serv. Resour. Bull. PNW-60, 40 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Two projections of softwood timber supply for 1970-2020 for California, western Oregon, eastern Oregon, western Washington, eastern Washington, and coastal Alaska are presented. One projection shows how much timber will likely be available in the future if forest management continues at recent levels. The second projection shows the impact of one program of intensified management on future timber supplies for these States except coastal Alaska.

KEYWORDS: Resources (forest), timber management planning, supply/demand (forest products).

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Within this overall mission, the Station conducts and stimulates research to facilitate and to accelerate progress toward the following goals:

1. Providing safe and efficient technology for inventory, protection, and use of resources.
2. Development and evaluation of alternative methods and levels of resource management.
3. Achievement of optimum sustained resource productivity consistent with maintaining a high quality forest environment.

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The FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.